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Corrosion of Metals

FUNDAMENTAL CAUSE ELECTRO-CHEMICAL

THE disintegration of metals, which is more commonly called corrosion, is an extremely complex thing to deal with. Many factors are involved in the process, which are not only inter-dependent but also vary widely in range. Control of any one of them may well be, in appropriate circumstances, the means of preventing onset of the action, or minimizing its severity after initiation, or even of displacing the seat of activity to some less harmful area.

Tendency to Revert

This destructiveness is experienced in many forms, differing greatly, though the process is basically the same in all cases. It is a natural phenomenon—the tendency of metals to revert to their original states; feeble in the case of the noble elements, which are in a pure metallic state when mined, but strong in the case of the baser ones extracted from ore. The greater the energy needed to produce a metal from the ore, the greater is the tendency of that particular metal to return to its original form.

Most metals are liable to corrode whenever moistened by an aqueous solution. When the latter contains oxygen, metallic oxides are formed; when it is acid, compounds of metallic salts result. Hence the necessity for the treatment of feed water for steam boilers as was explained in the paper read at the Institute of Marine Engineers last week, which is briefly mentioned on another page.

The author made use of chemical terms and equations in different ways purposely to express the same information alternatively, by way of illustration of the electro-chemical nature of what is usually considered to be a major cause of destructive corrosion.

Though over-simplified, perhaps, because the data he presents represent experimentation only at atmospheric pressure and low temperatures, nevertheless the evidence clearly shows how and why galvanic elements can form on wet metal, frequently on the surface of the same piece, so that difference of potential between them induces current to flow from the base (anodic) element to the noble (cathodic) element.

"Heat Flow" Theory

The local galvanic couples are created by differences in surface structure, due to variations of or adhesions to the metal. The consequential electro-chemical action may be sustained in several ways, one of which is difference of temperature. In these respects the Glasgow investigations support the theory that "heat flow" is the cause of corrosion which an Austrian contributor put forward (23rd September issue) when describing the protection of water turbine runners.

In the one case neutralization is by circulating counter-current in opposition to that generated thermo-electrically. In the other case treatment of the electrolyte (boiler water) is advocated as the means of rendering electro-chemical cells self-eliminating by progressive interphasing.

These reactions can be greatly intensified while a boiler is "standing" and

during the short time a water turbine is warming up, or cooling; the resulting corrosion can thus develop very much more rapidly than may be apparent from periodical service inspection.

WATER HEATER TAX

From the time it was imposed we have repeatedly demanded the renewal or reduction of the 100 per cent purchase tax on domestic-type electric water heaters. The Electric Water Heater Manufacturers' Association has naturally continued to protest against the tax, particularly as gas water heaters were subject to a rate of only 66⅔ per cent. The word "only" is used in a comparative sense for the gas industry, too, has actively campaigned to secure a reduction. Now, we are pleased to report, the Treasury has announced its intention of reducing the tax on electric thermal storage heaters to 66⅔ per cent. But the industry must still press for a further reduction or removal.

INCENTIVES FOR ELECTRICIANS

Last week we reported the deferment of a decision by the National Arbitration Tribunal on a wage claim by the Electrical Trades Union, in the hope that some form of incentive scheme would be introduced. At the Tribunal's hearing the National Federated Electrical Association would not agree that it was possible "to divorce and deal with as separate issues the twin problems of wages and incentive payments." This suggests that the N.F.E.A. believes that it is possible to secure more work from operatives by bonus payments. The problem, as we see it, is to speed up work without deterioration of standards —not an easy matter where so much work is concealed.

"ELECTRETS"

It was Heaviside who coined this word to describe the kind of dielectric which Faraday, in 1839, had suggested might retain an electric moment after an externally applied electric field had been reduced to zero. Almost ninety years afterwards the first "electrets" were made in Japan and they are now being experimentally produced in America. They are formed of certain plastic materials by electrification during the moulding, both processes being accomplished simultaneously with two-piece metal dies which are separately charged with d.c. and arranged to avoid short-circuiting when one part of the mould has to be heated. The pressure of moulding has to be quite small to avoid interfering with the mobility of the atoms which are, by this process, reorientated. It is this "reorganization" of particles which enables the material, although it is an insulator, to become charged so that it is possible to group a number of small elements of this kind into an assembly which can create a magnetic field of some usefulness. These "electrets" seem able to hold their charge for long periods without deterioration, and it is believed that "plastic magnets" of this kind may form inexpensive components of telephones, loudspeakers, etc.

"FREEDOM OF SPEECH"

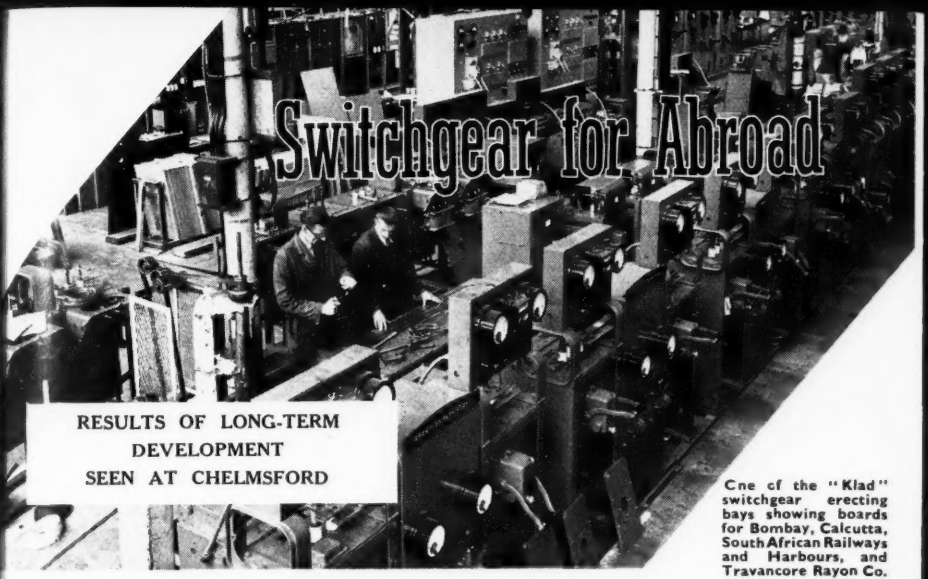
It is evident to us that there is not so much freedom of expression in our own and other industries as there used to be. We therefore heartily support the recent appeal by Brig. Gen. Sir. H. Osborne Mance, president of the Institute of Transport, to the heads of nationalized industries to allow employees of those industries to express their views. We would couple with this our belief that some of the larger "private" organizations are not altogether guiltless of the suppression of articles by their employees. Supervision is understandable but too much censorship is indefensible.

LIGHTING CHARGES

There have been complaints from many districts that charges for electricity for street lighting have been increased considerably by the Electricity Boards. It seems that some of the rises were overdue because some local authorities have been enjoying very favourable terms, generally when they had their own electricity undertakings. In some other cases the increase is not so easily justified and naturally the authorities have felt that they are being "squeezed." Generally the load is a good one, except at its beginning and ending in winter when it overlaps the industrial load and should be encouraged.

Switchgear for Abroad

RESULTS OF LONG-TERM DEVELOPMENT SEEN AT CHELMSFORD



One of the "Klad" switchgear erecting bays showing boards for Bombay, Calcutta, South African Railways and Harbours, and Travancore Rayon Co.

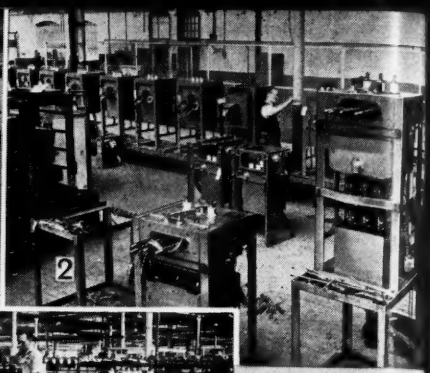
HAVING been producing switchgear for about seventy years, Crompton Parkinson, Ltd., and their predecessors, Crompton & Co., Ltd., can justifiably claim to have acquired some experience in these matters. It was in 1878 that the late Col. R. E. B. Crompton, founder of the firm, first started the manufacture of arc lamps and lighting sets, which soon necessitated the development of switchgear. A large number of other items have since been added to the company's range of products which now cover among other things generating plant, motors, transformers, batteries, lighting fittings, lamps, cables and instruments, but switchgear has always retained its prominent position in the organization.

Even in the quite early days Crompton switchgear began to find its way abroad, with the result that throughout the company's history new designs have to a very large extent been developed with an eye to successful operation in extremes of temperature and humidity in any part of the world. Besides assisting standardization and large-scale production, this policy has proved of inestimable value in readily meeting demands from abroad and so assisting in the expansion of the export market so vital to this country to-day.

At Chelmsford, where the original Crompton factory was opened, the company now has about 109,560 sq ft of floor space set aside for the manufacture of switchgear and when we visited the works recently nearly half the production was destined for export. A high proportion of this covered standard products, but there were also several special items to which we shall refer later.

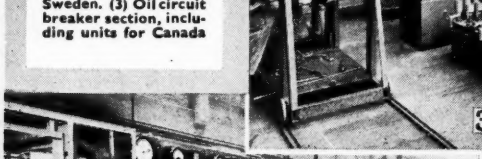
The factory, which is practically self-contained, is laid out on modern flow-production lines. In the sheet-metal section, the first we visited, one of the most striking features is the great care that is taken to guard against corrosion in

"Nelson" stud welding machine being used at Chelmsford to weld the insulator securing studs to type "A" ring main switch base plates



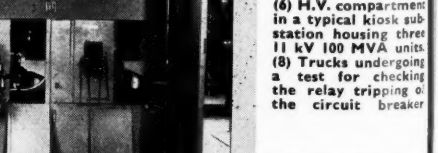
(1) Two 3-panel switchboards for 100 kW short-wave radio transmitters for Sweden. (3) Oil circuit breaker section, including units for Canada

(2) "Klad A" unit with SL-100 self-aligning contacts, having its contact system adjusted. (5) View of packing department



(4) "Klad" board for the Consolidated African Selection Trust. (7) Switchgear trucks being assembled for the Uganda Electricity Board

(6) H.V. compartment in a typical kiosk substation housing three 11 kV 100 MVA units. (8) Trucks undergoing a test for checking the relay tripping of the circuit breaker



service. The steel is first cleaned by power-driven wire brushes or by sand blasting and then taken direct to the paintshop (which is just being remodelled) for the first of its protective finishes. The various finished components are given a primary coat of red lead substitute, followed by a first coat of grey synthetic enamel before assembly, with a final coat of grey synthetic after assembly. Wherever possible dipping is employed.

Fabrication and Stud Welding

Circuit breaker tanks and similar components are nowadays almost always fabricated and for making such items as base plates great use is made of the company's "Nelson" stud welder. The employment of a high proportion of pressed components, together with ample jigs and gauges, and closely controlled machining of other components, ensures that parts are easily interchangeable and replaceable. Conveniently situated assembly and fitting sections are specifically laid out for manual and power closing mechanisms, oil circuit breakers, and isolating and knife switches. Separate sub-sections deal with sub-assemblies such as contact fingers, arc control posts and oil circuit breaker auxiliary switches.

We first visited the oil circuit breaker section where we saw a large number of "loose" breakers nearing completion for incorporation in switchgear in Canada. These were of various sizes, the two most popular being rated at 150 MVA at 6.6 or 11kV and 25 MVA at 3.3 kV. Outstanding features of the latter equipment are its remarkable compactness; it measures only 1ft 6in by 2ft by 1ft 8in, and the fact that the design is such that no arcing contacts are necessary. Many of them were of the side-blast baffle arc-control pot type. These breakers can be embodied in any cubicle, truck and compound filled gear.

Close by were being assembled "T.A.P." circuit breakers of the oil immersed automatic fuse type which have been designed especially to meet the need for efficient and inexpensive switches for rural development work in all climates. This type of circuit breaker differs from a normal unit in the method employed for tripping. A fuse is provided in series with the switch contacts on each phase. When the fuse blows it interrupts the current in that phase and releases the tripping mechanism, the current in the remaining phases being interrupted between oil switch contacts of normal form. Not only is there a saving in the cost of current transformers and associated gear and also the space required for their accommodation, but the elimination of the current transformers, relays, auxiliary contacts, trip coils, etc., lessens potential sources of trouble.

A substantial armourclad weatherproof construction has been adopted, with self-contained isolating features, tank lowering devices and full interlocks. Three models are available, all suitable for service up to 15 kV, with breaking capacities of 100, 150 and 250 MVA. The units can be supplied for separate installation or coupled to a transformer or a ring main unit.

Four types of Crompton ring main units are available for use with "T.A.P." gear. They are all designed for currents up to 300 A and 11 kV and differ principally in the comprehensiveness of the isolating arrangements and the type of switch used.

Low-Voltage Gear

In course of assembly in one of the erection bays was a large quantity of low voltage metalclad switch units of the "Klad" type for Bombay, Calcutta, South African Railways and Harbours, and the Travancore Rayon Company. For the Travancore company thirty of these and twenty-eight truck-type units are being supplied. Specially designed for the control of low-voltage substation feeders, industrial circuits, large motors, etc., the "Klad" gear is made in two types—form "A" with self-contained vertical isolation, with ratings up to 30 MVA, 1,200 A at 650 V, or 50 MVA, 400 A at 3,300 V, and form "B" without isolation features, with ratings up to 25 MVA, 600 A at 650 V. For either rating the design is generally similar although there are certain detail differences, principally in connection with the isolation features.

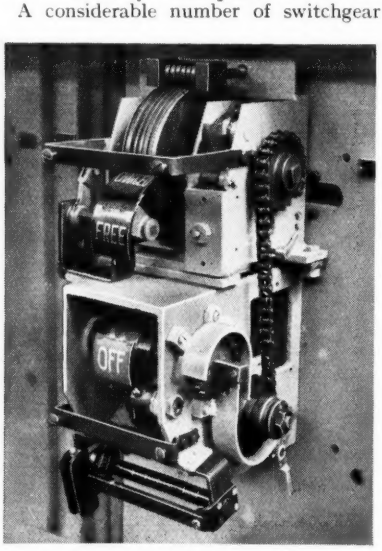
In the case of the form "A" units, complete enclosure of the isolating contacts is provided in both the "open" and "closed" positions, and isolation is effected by mechanical lowering and rais-

ing equipment of the jack-screw pattern, and the unit is complete with robust mechanical interlocks to ensure correct sequence of operation, and safety to the operators. Over-current releases of the series pattern with adjustable oil dash pot time lags can be provided on both the form "A" and "B" units up to 600 A full load current. Alternatively current transformer operated trip coils can be provided with either oil dash pot time lags or fuse-shunted time-lags.

In the final assembly department almost ready for despatch was a "Klad" board being supplied to the Consolidated African Selection Trust. This is required to control a 350 kW alternator, two 72.5 kW alternators and six feeders.

An interesting special order nearing completion was for two three-panel switchboards being supplied for use with 100 kW short-wave radio transmitters for Sweden. Each of the boards controls a 380 V, 3-phase 4-wire 50-cycle supply and various small distribution feeders, the latter being controlled by radial switches and fuses behind the hinged doors. The boards are finished in grey enamel to match the rest of the transmitting equipment. Close by was a panel for Madras.

A considerable number of switchgear



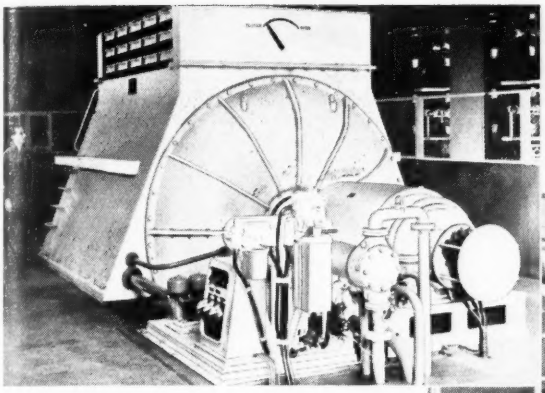
New spring-closing equipment fitted to an "ALA1" air-insulated vertically isolated unit

units of the truck type were being manufactured for delivery to Ceylon and Uganda, among many other places. Four sizes of units of this type are manufactured for currents up to 1,600 A at 11 kV and both single and duplicate bus assemblies were in the process of completion. One very interesting order undergoing test was a 12-unit "on load" duplicate bus switchboard with solenoid operated oil circuit breakers, with a rating of 250 MVA at 11 kV. As on all other switch units, full mechanical interlocking is provided to ensure that the load cannot be made or broken on the main plugs and sockets, by the fact that the oil circuit breaker must be in the "open" position before the truck can be inserted or withdrawn from its shell.

Vertically Isolated Truck Units

In an adjacent section vertically isolated metalclad units were being assembled. These are of two types: "ALA" which has air insulated busbar and current transformer chambers, and "CLA" which has compound filled busbar chambers and oil filled current transformer chambers. Three frame sizes are made for currents up to 1,600 A at 11 kV and breaking capacities up to 350 MVA. In these units the withdrawable truck is a completely welded structure running on roller bearing wheels and incorporating a vertical circuit breaker carriage which is provided with four adjustable guide wheels to ensure smooth and accurate running. The use of very complete jigs of heavy construction in the manufacture of these units enables them to be made within fine limits, ensuring easy interchangeability between withdrawable trucks and the stationary housings. On some of the units a new type of spring-closing mechanism, which incorporates very powerful clock-type closing springs, were being assembled.

In the department where kiosk substations are made, an order for Madras was noted, among many others. A completely welded framework is employed for these kiosks incorporating a special formed section which gives a very pleasing rounded effect to the corners. The single handle locks the doors both top and bottom as well as in the centre, and is specially designed to give ample leverage without any dangerous projections.



Alternator in the short-circuit testing station giving a 350,000 kVA symmetrical output for two seconds, and (below) the control desk of the short-circuit testing station

Cork is fitted to the underside of the roof, and in conjunction with adequate ventilation ensures freedom from insulation trouble or corrosion, a feature of special importance in humid climates. At the same time the structure is proof against the entry of rain, sleet, birds or small animals. A number of these kiosks have been in service for some time in Malaya and Canada, indicating the suitability of the design and construction for service in climatic extremes. Generally the interior of a kiosk is divided into three separate compartments for e.h.v. switchgear, transformer or transformers and l.v. switchgear respectively. Each compartment is provided with its own doors.

At Chelmsford the company has one of the six testing stations operated by members of the Association of Short-Circuit Testing Authorities. Established in 1940, the Crompton Parkinson short-circuit testing station is equipped with an alternator capable of providing 350,000 kVA symmetrical output for 2 seconds, and by making reconnections, an output of 100,000 A for 5 seconds without any decrement. It is also equipped with an electronically operated selector which enables faults to be imposed at a predetermined part of the voltage wave, in steps of 15 electrical degrees and within an accuracy of 0.00017 sec. This selector was developed in the company's own research department.

Apart from providing a guarantee of the minimum standard of performance since 1942, thirty-two Crompton Parkinson switchgear units have been awarded A.S.T.A. certificates of rating) the testing facilities available are of inestimable value to the designers in the development of improved switchgear with higher efficiency, shorter operating times necessary to clear faults, and less disturbance in a system due to high frequency transients occurring when carrying out switching operations.

Circuit breakers and switchgear units are tested in various stages of the development and altogether given many more onerous tests than those necessary for the issue of an A.S.T.A. certificate. Normally new circuit breakers and units are kept in the testing station for some considerable time after the final clearance of the design and the issue of an A.S.T.A. certificate and are used as back-up circuit breakers in order to obtain even further experience of the performance of these units when they are subjected to continuous heavy duty.

Views on the News

By REFLECTOR

TALKING to a lighting fitting manufacturer about the *Electrical Review's* special lighting issue last week, I was given two striking examples of the value of shop window lighting. An Oxford Street store, at the time in somewhat low water, increased its turnover by no less than 70 per cent following the acquisition of an up-to-date window lighting installation and is now one of the most prosperous establishments in the neighbourhood. Another firm declared that the extinction of lights in a window meant a reduction of £100 in turnover. So it is not surprising that shopkeepers are not very pleased at the continuance of the ban on lighting before 7 p.m.

★ ★ ★

In a recent "Eastern Electricity Bulletin," Mr. C. T. Melling, chairman of the Eastern Electricity Board, makes an understatement when he says that "sometimes in newspapers there are complaints about electricity supply." Since nationalization the service has come to be regarded as a legitimate target. Mr. Melling raises the matter to draw attention to another sort of letter, one which praises the Board for its promptitude and speed in dealing with a breakdown of supply to a mill. It is very pleasant to receive even one halfpenny when kicks are so plentiful and often so undeserved.

★ ★ ★

It must come as something of a shock to those who have always regarded radio extension loudspeakers as perfectly harmless pieces of apparatus to read of people being killed by touching them in bathrooms. Certainly in the earlier sets it was the practice to have the loudspeaker of the high-impedance type direct in the high-voltage anode circuit, but for many years now it has been exceptional to use anything but low-impedance loudspeakers connected to the secondary winding of a transformer, the primary winding of which is in the anode circuit. In the latter case the only risks likely to be encountered are that the insulation between the two windings of the transformer may fail or that the extension wiring may come into contact with the mains plug or bare flexible cable.

★ ★ ★

A short time ago, the Southport Corporation received back from the Merseyside and N. Wales Board a fountain which the Board had acquired with the municipal electricity undertaking. It had been suggested that the Corporation would have to buy the fountain but it was eventually given back. Now the South Wales Board is involved in a discussion upon the possible return of a building which it took over with the Cwmbran electricity supply. These premises have apparently become inadequate for the Board's purposes and it is endeavouring to find new accommodation and sell the present building to the Council. This is quite in order, of course, but I can quite appreciate the Council's feelings in the matter when it realizes that the purchase would involve a 2d rate.

★ ★ ★

The latest wonder from America is described in a note in the *Gardeners' Chronicle*. It is an electric weed killer consisting of a frame carried on four wheels from the axles of which "electrodes project into the earth like the fine teeth of a harrow." Current is produced by a dynamo on the frame (motive power unspecified) and "passes from one electrode to the other through the roots of the plants over which the frame is wheeled. Alternating current of a strength of about 12,500 volts is used for the operation which is claimed to kill most of the common garden weeds"—and the operator, too, I imagine.

★ ★ ★

Recently a jet-propelled aircraft cut into and brought down three 66 kV lines. The pilot luckily got through and reported on his landing twenty miles farther on that he had "encountered no further trouble." In reporting the incident the *Yorkshire Post* used the heading "Plane Hits 198,000 volt Cables." This non-standard rating was, of course, arrived at by multiplying 66 kV by three.

Personal and Social

NEWS OF MEN AND WOMEN OF THE INDUSTRY

IN our last issue we briefly reported the retirement of **Sir Geoffrey Clarke,** C.S.I., O.B.E., from the position of managing director and from the board of the Telegraph Construction and Maintenance Co., Ltd., and its associated and subsidiary companies, on medical advice, as from 1st January next, and the appointment of **Mr. J. N. Dean,** B.Sc., A.R.I.C., F.I.R.I., to succeed

Sir Geoffrey Clarke

Mr. J. N. Dean

him as managing director of the Telegraph Construction and Maintenance Co., and of the Selborne Plantation Co., Ltd.

Sir Geoffrey was born in India, and received his education at Trinity College, Dublin. He entered the Indian Civil Service in 1895 and became Postmaster-General in the Punjab in 1903. In 1918 he was appointed Director-General of Posts and Telegraphs in India. He joined the Telegraph Construction and Maintenance Co., Ltd., in 1926, as joint managing director with Mr. Willoughby S. Smith, and became sole managing director in 1932. Sir Geoffrey is a past-president of the London Chamber of Commerce and of the Associated Chambers of Commerce of Great Britain. He is a director of the P. & O. and British India Steam Navigation companies, and is chairman of the Calcutta Tramways Co., Ltd.

Mr. Dean was educated at Felsted School and at King's College, University of London. In the 1914-18 war he served as a flying officer (pilot) with the R.N.A.S. and the R.A.F. He was appointed research assistant with the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., in 1921, with whom he became chief chemist in 1929, and was appointed chief chemist of the Telegraph Construction and Maintenance Co., Ltd., in 1930, becoming technical manager of the company and of Submarine Cables, Ltd., in 1942, technical director in 1944, and works director with a seat on the board in 1947. He was also appointed a director of the Selborne Plantation Co., Ltd. His interests outside the electrical industry include farming, and he is a cattle and pig breeder.

Mr. E. R. Wilkinson, M.I.E.E., M.I.Mech.E., commercial manager of the British Electricity Authority who for the past two months has been investigating administrative and commercial aspects of electricity supply in the United States and Canada, returned to this country in the *Caronia* on Thursday last week.

Mr. G. N. Gabell was recently appointed secretary of the English Electric Co., Ltd., in succession to the late Mr. G. W. E. Hooper. Mr. Gabell joined the company as assistant secretary in 1936. During the war he served with the West Yorkshire Regiment.

Mr. L. J. Scully has joined the sales staff of British Moulded Plastics, Ltd., as area manager. He was previously general manager for Airfix, Ltd., and before that sales manager of the moulding powder section of B.X. Plastics, Ltd.

Mr. J. Woodeson has succeeded his father, the late Mr. W. A. Woodeson, as chairman of Clarke, Chapman and Co., Ltd. **Mr. W. O. Henriques** has been appointed vice-chairman.

Mr. S. S. Taylor, C.M.G., D.S.O., vice-chairman of the Copper Development Association, was elected chairman of the Association at the annual meeting held on 9th November to fill the vacancy caused by the resignation of the **Hon. R. M. Preston,** D.S.O., who has held this office since 1945. **Sir William T. Griffiths** was elected vice-chairman, and **Mr. R. L. Prain,** C.B.E., has succeeded Mr. Taylor as chairman of the Management Committee.

Mr. F. E. Buckell, manager of the Airnautical Department of the General Electric Co., Ltd., is at present in Canada with a view to obtaining orders for British airborne electrical equipment and he expects to in-

terest Canadian civil aviation authorities in aerodrome lighting apparatus. Mr. Buckell has already been instrumental in getting an order for his company for lightweight aircraft ventilation equipment for use on Canadian "North Star" aircraft of the Trans-Canada Airlines. He intends to visit the United States before his return.

Mr. G. B. Dalzell, of Halifax, has been appointed secretary of Hipprum Wires, Ltd., as from 1st November. He was educated at Heath Grammar School, and was articled to Mr. C. M. Whitham, of Whitham & Turney, chartered accountants, Halifax.

Mr. F. G. Cook, manager of instrumentation exports, and **Mr. E. Garthwaite,** development manager, of Marconi Instruments, Ltd., are paying a six weeks' visit to the United States, where they will explore the marketing possibilities for Marconi instruments.

Mr. G. H. Fletcher, M.I.E.E., M.I.Mech.E., has been appointed general manager of the Sheffield Works of the Metropolitan-Vickers Electrical Co., Ltd. He relinquishes his title of chief engineer and manager, Sheffield Works. **Mr. H. Newsam,** B.Sc.(Eng.), A.M.I.E.E., takes over the duties of chief engineer, Traction Motor Department. **Mr. R. P. Knight,** A.M.I.E.E., is appointed assistant manager, and **Mr. H. Taylor** becomes superintendent of the works.

Mr. G. H. Fletcher

Mr. H. Newsam

Mr. R. P. Knight

Mr. H. Taylor

Mr. Fletcher, who received his technical training at the Victoria Technical College, Preston, joined the company (then the British Westinghouse Co.) in 1914. He was first engaged on the design of industrial motors, and was later responsible for the design of the company's first traction motors. Previously these had been built to designs furnished by the parent company in America. When the manufacture of traction motors was transferred to Sheffield in 1922 Mr. Fletcher was appointed chief engineer, and in 1930 he became manager in addition. In 1948 he was appointed to the board of the Metropolitan-Vickers Electrical Export Co.

Mr. H. Newsam became a college apprentice in 1929, and on the completion of his course entered the Traction Motor Engineering Department, being appointed assistant chief engineer in 1945. In 1936 he was awarded a General Electric Fellowship for two years, which he spent at the Erie Works of the General Electric Co., U.S.A.

Mr. R. P. Knight joined the company in 1922 as a special trainee and in 1928 went to India as technical assistant to the resident engineer in charge of locomotive erection, Great Indian Peninsula Railway. Returning to this country he was successively engineer, Traction Motor Department; superintendent, Sheffield Works; and assistant to manager, Sheffield Works. Mr. Knight has played a prominent part in the development of electric battery vehicles.

Mr. H. Taylor was in the traction motor drawing office from 1923 to 1934, when he became mechanical engineer responsible for gear design, on which work he was engaged until 1940. He was responsible for the patented rubber resilient gear wheels of which many hundreds have been made. In 1940 he became chief inspector and in 1945 assistant superintendent, Sheffield Works. He was educated at Sheffield University where he gained the associateship in mechanical and electrical engineering.

The annual dinner of the **J. & P. Foremen's Association** held at the R.A.C.S. Restaurant, Woolwich, on 4th November was attended by 130 members and guests. Proposing the toast of the company, Mr. S. A. Simmons, chairman of the Association, spoke of the harmony existing between the management and foremen. In reply Mr. G. L. Wates, chairman and joint managing director of Johnson & Phillips Ltd., dwelt on the important role of the foremen in the organization and warned his listeners of the difficult trading position that was arising. Mr. J. Wooldridge, manager of the cable department, proposed the

toast of the Foremen's Association and said that export orders were now becoming increasingly difficult to obtain. The secretary of the Association, Mr. J. A. Hayward, replied.

The cricket team of **Salford Electrical Instruments, Ltd.,** were the winners this summer of the championship shield of Division 3 of the Manchester Amateur League. To

Mr. H. Cobden Turner, managing director of Salford Electrical Instruments, Ltd., presenting the cricket shield to Mr. L. Abbott

celebrate the team's success, a smoking concert was held recently at the company's Peel Works, at which Mr. H. Cobden Turner, managing director of the company, presented the shield to Mr. L. Abbott, hon. secretary of the Sports Club.

According to the *Daily Dispatch* **Mr. Bertram Kelly,** formerly borough electrical engineer of Douglas, Isle of Man, has been appointed Vicar of Santon, Isle of Man.

Staffs of the **Southern Electricity Board** from Aldershot, Basingstoke, Chichester and Isle of Wight attended the recent ball of the No. 3 (Portsmouth) Sub-Area, held at the Savoy Ballroom, Portsmouth. Over 500 guests attended and were received by Mr. E. A. Logan and Mrs. Logan, who represented Mr. W. G. Turner, the Sub-Area manager, who was unavoidably absent. Mr. R. R. B. Brown, the deputy chairman of the Board attended with officials of the head office, and greetings were received from Lord Citrine and Mr. H. Nimmo (chairman of the Board).

Obituary

Professor A. S. Barnes.—The death is reported at the age of eighty-one of Professor Alfred Schwartz Barnes, M.I.E.E., who in the early part of this century was professor of electrical engineering at Manchester University. Later he became staff inspector, engineering, Board of Education, and served as science secretary to the Advisory Council on Scientific & Industrial Research.

Mr. J. R. E. Daft, manager of the Hereford District of the Midlands Electricity Board died at the County Hospital, Hereford, on 4th November at the age of forty-three, from the effects of infantile paralysis. Mr. Daft was educated at Bromsgrove School. After three years with the British Insulated and Helsby Cables, Ltd., he joined the former S.W. & S. Electric Power Co., on rural development work and subsequently became divisional mains engineer at Evesham until 1940, when he was appointed divisional engineer at Hereford. Following nationalization he was appointed manager of the Hereford District, which now includes Ledbury and Ross. Mr. Daft's outside interests included the hon. secretaryship of the Hereford Science Club.

Mr. D. J. Strutt.—The death occurred on 6th November, in his seventy-fourth year, of Mr. Denner John Strutt, who retired from the British Thomson-Houston Co., Ltd., at the end of 1946, after more than thirty-seven years' service. During most of that time he acted as commercial engineering representative for the company in the Midlands.

Mr. P. J. Waldram.—The death occurred on 8th November at the age of eighty of Mr. Percy John Waldram, F.S.I., L.R.I. B.A., M.R.I., who made a special study of the natural illumination of buildings. He was on the Advisory Committee on Illumination of the Department of Scientific and Industrial Research and the International Commission on Illumination, and was the author of numerous works on illumination. He was the father of Mr. J. M. Waldram, who is senior research illuminating engineer with the General Electric Co., Ltd.

Major A. L. Chandler.—The death occurred on 2nd November at the age of fifty-eight of Major A. L. Chandler, M.C., chairman of W. T. Glover & Co., Ltd. After rendering distinguished service in the 1914-18 war, Major Chandler spent a short time with the Metropolitan-Vickers Electrical Co., Ltd., as assistant secretary. He joined Glover's, first as general manager, later became managing director, and finally was appointed chairman.

Mr. J. E. B. Adams.—The death, on 30th October, is reported of Mr. John E. B. Adams, managing director of John Adams, Ltd., Manchester, members of the Electrical Contractors' Association.

Ald. Oswald Jones, J.P., a member of the Mersey & North Wales Electricity Consultative Council, died on 5th November.

Will.—Mr. C. W. Harsley, district manager of the Edison Swan Electric Co., Ltd., who died on 17th June last, left £6,365 gross (£5,683 net).

I.E.E. War Memorial

UNVEILING OF TABLETS AT DEDICATION CEREMONY

IT is a sad reflection on world affairs that a second ceremony of commemoration of members who lost their lives through enemy action should have to be performed in the London headquarters of the Institution of Electrical Engineers during the lifetime of many who remember the former similar occasion.

While the procedure was generally the same in form and dignity, a few simple divergencies reflected the different circumstances in which members rendered service to their country in the two wars. In the 1914-18 struggle most of the casualties were among members who were combatants, participating in their country's defence as ordinary citizens rather than engineers. The relative immunity of civilians during the first war was not repeated in 1939-45, when a significant proportion of the casualties commemorated last week occurred among civilian engineers performing their essential tasks under enemy action.

For these reasons, since all shared common risks, instead of a senior military personality, it was Professor E. B. Moullin, president, supported by the past-presidents who were in office during the war years, who performed the unveiling ceremony on 11th November. The dedication service was conducted by the Rt. Rev. A. C. Don, Dean of Westminster, with choristers of H.M. Chapel of the Savoy leading the singing, accompanied by a section of the staff band of the Royal Electrical and Mechanical Engineers, members of which also sounded the "Reveille" and the "Last Post."

The 1939-45 commemoration tablets mounted in the hall of the Institution of Electrical Engineers beneath those erected after the first world war

Thus two bronze tablets, suitably inscribed, now supplement the existing wall plaques in the entrance hall of the I.E.E. building. The names of the fallen, instead of being inscribed with those of the first war, have been written in a Book of Remembrance to be preserved in the library.

A further memorial will endure in "The Chesters," a residential estate at Malden in Surrey (where building operations have recently begun), which by the generosity of many donors to the Homes Fund (still open) will provide in 24 homes, as at present planned, accommodation for about 60 people and perpetuate two separate, but related, aspects of the Institution's homage to its dead.

E.C.A. Annual Dinner

THE Electrical Contractors' Association announces that its next annual dinner will be held at the Savoy Hotel, London, on 31st January. Tickets (available to members only) will cost 30s. (exclusive of wine). Formal invitation cards for the use of members in inviting personal guests are available on request. It is stated that there is insufficient accommodation available to provide for lady guests.

This Earthing Fetish

Must We Alter Our Ideas About House Wiring?

BY T. C. GILBERT, M.I.E.E.

REPORTS of the Fire Research Board are not, unfortunately, widely read by electrical engineers, although they contain much of interest for the installation engineer in particular. The report for 1948 is no exception, as it has observations to make concerning installations in post-war temporary houses which cannot fail to cause concern.

According to this report (*Electrical Review*, 16th September, 1949) the occurrence of fires in such buildings due to electrical failures amounted to a percentage which may appear to be very high, but it is unhappily confirmed. Some 2,598 originated in the wiring. It is this significant figure with which the writer is mainly concerned.

In further confirmation of this gloomy tale we now have the report from the Manchester area by officials of the North-Western Electricity Board in connection with the 37 established electrical fires in 133 prefabricated houses, in addition to numerous complaints of shock by the occupants of other houses. There have also been reports from other parts of the country concerning the inability of tenants to enter their aluminium houses owing to uncomfortable sensations when trying to insert their keys in their front doors.

Unisolated Earth Leakages

In the case of the Manchester houses it is stated that earth clips were missing completely in six houses and loose in many others. From this it may be deduced that the authorities concerned take the view that the troubles were connected with failure of earthing. With practically universal a.c. supplies it is unlikely that electrolysis played any part, in spite of the excessive condensation in some prefabricated houses; short-circuits are comparatively mild as compared with the old d.c. flare-ups and it would seem that the old trouble of unisolated earth leakages was responsible.

The point is, however, that we as installation engineers have now seriously to ask ourselves if our present ideas and methods of wiring houses do not set up undue risks of fire. It will be said that as the earth clips were loose or missing then the installations were not properly made, were not in accordance with the regulations, and would have been disowned by any responsible firm. This will be agreed, but what is disturbing to me is the fact that absence of clips and the incidence of loose clips is inherent in our method of applying earth leakage protection. It is my experience, gathered over many years of installation work in this country and abroad, that 50 per cent of installations, however well made in the first instance, do not retain their pristine earthing excellence beyond a matter of a few months. The installations under consideration are certainly not more than five years old.

Continental Comparison

We are reliably informed that in some Continental countries, especially Switzerland, whose installations it is the custom to deride and where earthing as we know it is not practised at all, the proportion of established electrical fires does not rise in any year above about 4 per cent of the whole number. It would not be right to advocate for this country that metal-clad wiring should be left unearthed as, although this might diminish the fire risk, it would not altogether eliminate it: I would go further and say (i) that metal-clad wiring should not be used in any installation except where the conditions specifically demand it and (ii) that in all other cases the insulation of the cables must be reinforced by non-metallic enclosures, which principle should also be extended as far as possible to all equipment. This would, of course, revive the crusade for "all-insulation" of twenty years ago. With modern plastic materials we would come very near achieving the ideal.

The metal-cladder will say that had all these wiring installations been made in accordance with the generally accepted

rules and regulations, then the difficulties and dangers would not have arisen. This will be disputed, as it needs only one oversize fuse to undo all the care that has been bestowed on the protective circuit, while rust and corrosion can effect ruin in a very short time—and who is to know? Simple resistance tests can hardly ever discover the loose earthing clip, unless carried out with heavy currents, and we all know how often *that* takes place.

Unrealistic Regulations

Further, I would descend to rank heresy and say that most of our earthing regulations are quite unrealistic, amounting often to no more than pious hopes. Let us look at the latest to be issued, those found in para. 513 of Code of Practice 321/1948, "Electrical Installations, General," in which we find the following requirements: "The resistance of the path of the leakage current from the point of leakage back to the neutral point of the supply system may be made low enough to cause the operation of the fuses or circuit-breakers provided to protect the circuits against over-current" and "a separate device responsive to the value of the leakage current practicably obtainable may be connected in the path of the leakage current."

Now who can possibly say, or even make an intelligent guess, where the leakage path will be and what value of leakage current is *practicably* obtainable when an earth fault takes place, as it usually does, at some point in a motor winding, or half-way along a heater element? Without this essential data, the supposed safety measures fall to the ground and the stage is set for the unisolated earth leakage, fire-raiser No. 1, in any wiring installation, however well made and however blessed by regulations. In a bad installation, the risk may even be less.

The draft of the new Code, now circulated for comment, entitled "Farm and Horticultural Electrical Installations" puts the matter in a nutshell by stating in para 0.311 that "It is essential that the resistance of the *whole* earthing circuit path should be so low that the supply of electricity is cut off before any object, from contact with which a shock could be received, has attained a potential of 40 V to earth." As this path may contain the fault resistance, what value has the word "essential" in this connection? By the way, as this fault path may include a few turns of a motor winding, should we not now begin to speak of "impedances" in the earth circuit instead of "resistances"?

It is my firm opinion, based upon many sad experiences with earthing as we know and approve it, that we not only have to enclose our circuit conductors in non-metallic casings, but, in addition, all earth wires or conductors of any kind which must still be used for such equipment as remains metal-clad for the time being *must also be insulated*. That is to say, the protective conductors must be enclosed in the insulating sheaths and treated as of equal importance with the circuit conductors, which they in fact are.

This idea is not so far-fetched after all: in fact it reflects modern requirements in other directions, since good practice demands that all earthing conductors passing down to earth electrodes should be insulated to prevent the occurrence of potential gradients. This requirement is restated in para. 0.311 (d) of the new draft Code mentioned above. Again, in the same paragraph, under (g) we find:—"The lead connecting the various earth-continuity conductors to the earth-electrode should be mechanically strong and of adequate cross-sectional area to carry the maximum earth leakage current expected. *It may be necessary to insulate the conductors . . . .*"

The italics are mine, but note the plural and, as the potential set up will be extended throughout the whole of the earth continuity conductor's ramifications, is it not just plain common sense to insulate the lot?

Earthing and Fire Risk

It can surely be said that had no form of earthing been introduced into the unfortunate prefabricated houses mentioned earlier then the fires would not have occurred! Why is it necessary, in our attempts to reduce still further the already negligible number of shock accidents, to saddle ourselves with a Frankenstein monster that places us so high in the Fire Research Board's percentages? Electricity does not deserve this unwelcome elevation and the figures might be

as low as Switzerland's if we could throw away our earth wires, our metal enclosures, and use the logical method of running conductors in insulated casings.

Space will not permit any diversion into the attractive byway as to how many accidents are actually caused by earthing, but it may be noted in passing that the correspondence columns of the *Electrical Review* (2nd September, 1949) drew attention to the risk associated with the cutting short of an earth conductor in a flexible cord when appliances are used from 2-pin plugs or adaptors. Unhappily, confirmation of this point came quickly, in the following week, when it was reported that a fatality had occurred at Darlaston due to the inadvertent entry of the unused earth conductor of an iron into the adaptor. But for the existence of this third conductor no accident need have occurred, and this must be placed on the debit side.

Nor can exploration be made into the possibility of heavy fault currents on distribution networks being brought into the installation via the earthing connections, but this danger and its possibility have already been dealt with in Home Office reports, in their authorative consideration of fire risks associated with unisolated earth leakages. It can be said, however, that this is a not unknown cause of fire in buildings and may occur oftener than is known from all evidence remaining after a fire.

Use of Water Mains

Since the above was written, an E. R. A. report (ref. V/T.101) on "Electrical Resistance of Water Mains with Particular Reference to the Asbestos Cement Type" has been published, dealing in the main with difficulties that have been already encountered in the Manchester and Rochdale areas. From this report, the danger of earthing to metal service pipes in eventual connection with asbestos cement mains is established, and an installation would appear to be safer unearthed.

Even more important, possibly, is the necessity for the abandonment of continuity in the internal installation for, without such continuity, leakage to one appliance is confined to that particular device. With internal continuity and doubtful earthing effectiveness, leakage to a faulty device is extended to all other sound devices in the installation, some of which may be in highly dangerous situations from the users' point of view.

The alternative suggested in the report "....considered conclusion that where lead covered cable is available it should be used for earthing in strong preference to the water mains, provided the sheath is always kept bonded and earthed...." can hardly receive wholehearted endorsement, as this facilitates the entry into the internal installation of cable network faults, already shown to have been the cause of fires.

Evidence accumulates daily to the effect that our present concentration upon indiscriminate earthing is likely to result in danger rather than safety.

The writer would plead for a more realistic consideration of earthing, whether it really does provide any real protection of the consumer and if it *might*, in some cases, whether the price paid is too high. Should not much more be done along the lines of *preventing* leakages, rather than occupying ourselves with methods of isolation after they have occurred—methods which appear to show no real return after many years, although they double the cost of our installations. There appears little point in, possibly, preventing a few shocks if the price is paid in fires, and it must be agreed that all the evidence points that way at present.

Street Lighting Schemes

WANDSWORTH Borough Council reports that the Ministry of Transport has authorized the installation of sodium lighting at Wimbledon Park Side and Putney Hill at an estimated cost of £3,210.

A scheme for the provision of street lighting in New Chester Road, Birkenhead, has now been approved by the Minister of Transport and the contract has been placed with the Merseyside and North Wales Electricity Board.

Scunthorpe Corporation proposes to carry out a scheme for the conversion of street lighting to mercury discharge lamps at an estimated cost of £11,000.

Swadlincote U.D.C. proposes to submit to the Ministry of Transport plans for a seven-year programme for the conversion of street lighting to electricity, and is to seek authority to carry out the first year's programme at an estimated cost of £4,300.

Design Development

Methods in a Medium-sized Firm

ACTIVITIES appropriate to the development section of a manufacturing concern of medium size were the subject of the address delivered by Mr. J. W. Donovan (director, Donovan Electrical Co., Ltd.) as chairman of the South Midland Centre of the Institution of Electrical Engineers.

About half the products manufactured in the United Kingdom were made by firms employing not more than 300 people. If, in the electrical industry, new methods of plastic moulding and diecasting were developed, greatly reducing the cost for small quantities, they would increase the proportion of small firms.

A medium-sized manufacturer must limit his activities to a small section of the industry he served; so specialization within a narrow range was necessary and must not call for more capital or research facilities than his resources made available. These requirements had not been too difficult to fulfil in the past, largely because thought was quickly translated into action in a small organization. Matters received more undivided attention, since there was less passing-on of responsibility—there was no one to whom it could be passed.

In outlining the way in which new designs were usually developed Mr. Donovan indicated that the Sales Department largely determined what should be developed. Therefore the Development Department must keep itself well informed about current practice and observe likely trends, but it was insufficient to rely on ideas from outside sources. Original thought and work were imperative, so quality of men was more important than resources. Factory workpeople could often make real contributions to detail improvement when it involved mechanical ingenuity rather than technical knowledge.

The design and model stages of development might be lengthy. It might be thought that undue reliance was placed on the making and physical testing of prototypes. There were too many variables in practice to enable a design to be put into production straight from the drawing board. Price affected estimated sales and the latter, in turn, affected the design and method of manufacture. In a smaller company the limitation of finance governed the purchase of special purpose machines, so the manner in which component parts were to be made needed to be settled with special care. For the same reason a small company might be forced to rely on an undue amount of improvisation in the testing of its new designs.

Besides gathering information for use in design, the Development Department could render valuable help to the engineering and production sections of the factory by supplying specialized data in a readily usable form. An example was the collection of data concerning the electrical surface tracking of plastic materials. The subject was seriously complicated by the lack of satisfactory methods of testing this particular property in the laboratory. As there was no normal scale of measurement, available data were relative only, meagre in any case and, moreover, the difficulties of setting up a standard test were very considerable.

The cost of a Development Department of the type described approximated to 2 per cent of the turnover, which figure included wages and salaries, materials used, overhead charges and interest, and depreciation of both equipment and buildings.

Resistance Welding

IN the October issue of the welding research supplement to the *Transactions* of the Institute of Welding is a report entitled "An Evaluation of the Resistance Welding of Tin and Tin-Zinc Alloy Coated Mild Steel." This report by A. J. Hipperson, B.Sc., and P. M. Teanby has been prepared as a result of experimental work by the Welding Research Association in conjunction with the Tin Research Institute.

During the investigations no difficulty was encountered in flash welding any of the coated steels and the properties of the butt joints were comparable with those obtained in uncoated sheet. The production of spot welds in tin and tin-zinc alloy coated sheet was found practicable, but closer attention had to be given to the welding machine settings and electrode maintenance than is necessary with uncoated sheet. Tin-zinc alloy coatings were found to be better suited to spot welding than plain tin coatings. With the latter, electrode life was much shorter and adhesion of the electrode tips to the surface of the stock presented some difficulty. The presence of zinc in the coating appeared to improve weldability considerably. The use of fully automatic machines is desirable for welding coated steels because success depends largely upon the use of accurately controlled machine settings.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Thermo-Couple Alloys

It is announced that two thermo-couple alloys for high temperature measurement are being produced at the works of the BRITISH DRIVER-HARRIS CO., LTD., Gaythorn Mill, Albion Street, Gaythorn, Manchester. These products, T1 (nickel-chromium) and T2 (nickel-aluminium) are similar to those which have been used in industry for many years and were composed of materials imported principally from dollar sources. The wholly British-made alloys will operate at the same temperatures as those usually covered by similar imported materials, the thermal e.m.f. values following the same general curve.

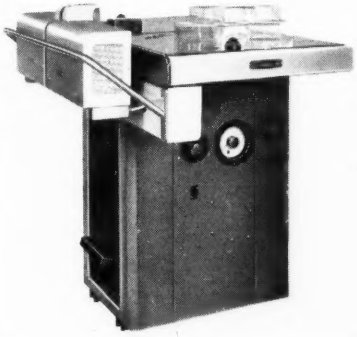
High-Frequency Box Welder

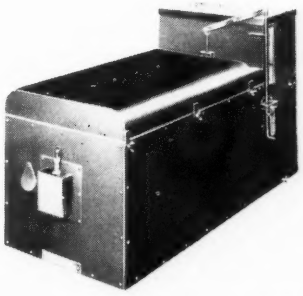
The "J.P.4" high-frequency equipment has been designed by REDIFON, LTD., Broomhill Road, Wandsworth, London, S.W.8, solely for the purpose of welding transparent boxes made from cellulose acetate sheet. Boxes and lids of square or rectangular shape can be welded using standard blanks with overlapping edges to any sizes up to 20in by 12in by 5in. The apparatus can be set up quickly, and changing over from boxes to lids can be effected in a few minutes. Production of 300 completed medium-size boxes an hour is a comfortable minimum for any operator. A very high operating frequency (over 100 Mc/s) has been adopted in order to secure the safe application of power to materials having comparatively low electrical breakdown. Two self-contained h.f. power units each supply power for the welding of one seam. Every precaution is taken to prevent electric shocks or burns.

Rotary Drying Plant

A rotary drying and preheating unit for polyvinyl-chloride chips, cellulose acetate, diakon and similar granules has just gone into production at the works of the CHANDOS ENGINEERING CO., LTD., 17, High Street, Egham, Surrey. It comprises a specially constructed drum mounted on the incline to the periphery of which are attached tapered rectangular ducts into which the material is fed. These ducts revolve round a heating element in the centre of the drum so that heating is uniform. The material travels just over 30ft during the ten minutes that it is in the 2ft 6in long drum and it is constantly in contact with the heating surface, moisture being carried away by convection.

At the discharge end the material is fed either through a chute into a hopper feed chamber or into a hopper from which smaller machines can be supplied. The

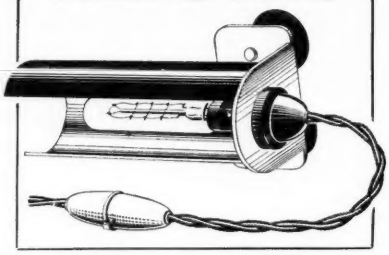




Chandos rotary drying plant

(Left) Redifon "J.P. 4" box welder

G. R. Gibbons "Majik" portable lamp



speed of the drum and the temperature of the heating element can be varied to suit individual requirements. Settings can be fixed so that apart from switching on the heating element and drum mechanism, no further adjustments are necessary during the drying operation.

The mechanism is driven by a 1/35 h.p. geared motor and at normal working for an 8oz machine the power rating is about 750w.

Neon Test Lamps

Three robustly constructed neon testers suitable for use on from 70 V to 500 V have just been placed on the market under the trade name "Neoflec" by GRAFTON KERSTEN & CO., LTD., 77, South Audley Street, London, W.1. The main body of each device is of black moulded material and the neon lamps are protected by means of an unbreakable transparent plastic cover. The simplest model ("Type 101") is a pocket tester about 3¼in long supplied with two 1ft long test leads.

"Type 200" tester is for electricians who want both hands free. It has a plug termination allowing it to be inserted into the live side of a mains plug, while the wander plug at the end of its 3ft length of flexible cable makes testing an easy matter.

A dual-purpose tester ("Type 303") similar in appearance to a fountain pen is complete with a pocket clip. It is about 5¼in long and can be supplied with a shielded connecting plug and a 6ft length of h.v. cable to a test prod.

Decorative Shades

A range of decorative shades introduced by SMART & BROWN (ENGINEERS), LTD., 25, Manchester Square, London, W.1, extends the use of fluorescent tubes in the home, hotel, theatre or showroom. Types are available to accommodate 2ft, 3ft or 4ft tubes, in both printed and plain linen and also in pink or ivory "Crinothene" for ceiling suspension or wall mounting. Shades for incandescent lamps are also supplied in the same materials.

Portable Lamp

The incorporation in the design of two rubber suction cups enables the "Majik" lamp to be attached immediately to any smooth surface. The lamp is safe to handle, the body being constructed of a tough non-conducting plastic material. It is designed to house a 25 W tubular lamp, an adjustable shade directing the beam in any desired direction. Among suggested applications are for shaving, as a bedlamp, for workbenches, for porches and for illuminating signs and notices. The manufacturers are GEO. R. GIBBONS (WIPERS), LTD., Egerton Buildings, East Ordsall Lane, Salford, 3, and the price is 17s 6d, including purchase tax.

Dry Shaver

A new type of electric dry shaver, the "Philishave", is now available from PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2. It is being manufactured at the company's Hamilton works in Scotland and was first on view to the public at the recent Scottish Industries Exhibition in Glasgow.

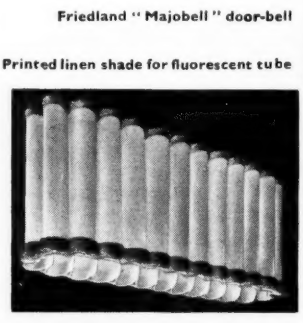
The general appearance of the unit is unusual in that the cutter head, which is circular in shape and incorporates a six-bladed self-sharpening rotary cutter, is situated at the side of the white moulded body. The unit is supplied with a length of flexible lead, a two-pin plug and bayonet socket adaptor, the plug incorporating a voltage adjusting switch to facilitate operation on a.c. or d.c. mains of from 110 V to 250 V.

Door-Bells and Buzzers

V. & E. FRIEDLAND, LTD., Lower Heys Mill, Macclesfield, Cheshire, have brought out electric door-bells and buzzers specially designed so as not to interfere with radio and television reception. The "Majobell"

Friedland "Majobell" door-bell

Printed linen shade for fluorescent tube



is fitted with a flexible striker arm to produce a clear ringing tone from its 3in gong: it costs 7s 3d. The "Majobuzzer" (price 6s) provides an agreeable signal for houses where bells are considered too noisy. Both instruments are designed for operation on 8-12 V a.c.

General-purpose Time Switch

A general-purpose time switch for controlling single-phase loads of up to 15 A, is now being manufactured at the works of UTILITIES (LONDON), LTD., 435-437, Brixton Road, London, S.W.9. It is operated by a 200-250 V or 100-125 V 50 c/s synchronous motor, and has large, clear, anodized time-setting 24-hour dials graduated in 15-minute intervals, thus allowing accurate time and circuit operating setting to within seven minutes, on and off once every 24 hours.

The switch incorporates a 0.5 A renewable cartridge fuse in the motor circuit, and the whole is contained in a die-cast aluminium case provided with conduit entries and hinged cover. The overall dimensions are 7in high, 6in wide and 5in deep, the weight being 6 lb.

Miniature Rectifiers

In order to meet the need for miniature high-tension selenium rectifiers in the radio and allied industries a new range of "Sentercel" components has been introduced by STANDARD TELEPHONES & CABLES, LTD., Rectifier Division, Warwick Road, Boreham Wood, Herts.

The construction of these rectifiers embodies a tubular rivet instead of the more conventional spindle, which, together with an improved manufacturing technique, enables them to be made smaller and at a lower price.

The range comprises three basic types of half-wave rectifiers, which are capable of withstanding a maximum peak inverse voltage of 350 V and they can be supplied for delivering mean output currents of from 30 to 120 mA.

For high-frequency work a single element rectifier is available mounted in an aluminium case and furnished with wire connections. As it measures only 0.125in by 0.25in by 0.25in and weighs 0.015 oz it is claimed to be the smallest of its type so far produced.

With frequencies below about 5 Mc/s this "M1" rectifier can, in the majority of cases, be used to replace a thermionic diode. The maximum peak inverse voltage which it can withstand is 50 V and 0.5 V is the maximum a.c. input necessary for satisfactory rectification.

Combined Switch and Fuse Unit

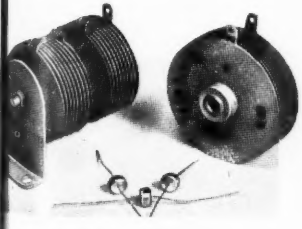
An all-insulated combined switch and consumer's fuse unit is offered by SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4. The unit comprises a 60 A double-pole short break main switch with single-pole h.r.c. fuses rated at 5, 15 or 30 A, a neutral bar and earthing bar. Knockouts are provided in the case for outgoing and feed cables which may be tough rubber, lead-covered or v.i.r. in conduit. The fuse chamber cover is carried on patented two-position spring hinges which provide a positive snap-to action in the closed position and will hold the cover open at 90 deg for the replacement of fuses.

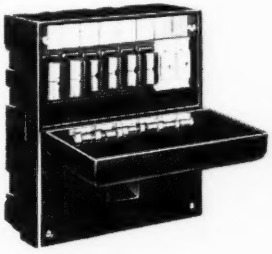
Ample wire space and easy access to terminals are provided, while the overall dimensions of the unit are only 8¼in by 9¼in by 4¼in. The unit is available in two sizes for 6-way and 8-way circuits.

Strip-lighting Lampholders

Edison-screw strip lighting lampholders are now being made by VICTOR H. IDDON, LTD., Harper Road, Wythenshawe, Manchester, under the trade name of "Nettle." They are made of black moulded material and have flanged bases with facilities for screw fixing. The terminals are exposed at the front but there is also access for back wiring.

Sentercel" miniature h.t. and h.f. rectifiers for radio and allied work





Siemens combined switch and fuse unit

'Nettle" lampholder

Supply in the North East

Board-Division Relationship : Tariffs : Installations

THE fiftieth anniversary of the establishment of the North Eastern Centre of the Institution of Electrical Engineers is being celebrated this session during the chairmanship of Mr. T. E. Daniel, whose inaugural address at Newcastle-upon-Tyne dealt largely with the organization of the North Eastern Electricity Board, of which he is deputy chairman.

In that Area, he said, there was close working between the Division and the Board and, in several cases, common services were operated by both. The policy would be to develop at 20 and 11 kV, leaving the main distribution at 66 kV. Incidentally a substation of 30 MW at 66 kV required an area of approximately 22,750 sq ft, or half an acre.

Mr. Daniel believed that the consumption per head of the population might be doubled in the not distant future. While it was most desirable that tariffs should take on a standard form, to make them common to the country as a whole, it would be a mistake to insist that the same charges should be made in all Areas. There was room for keen competition between Divisions in respect of "cost efficiency," as distinct from thermal efficiency, the effect of which could be reflected in the cost at which bulk supplies were received by the Area Boards and upon which the latter must base their tariffs.

Towards More Uniform Practice

The reduction of the number of controlling authorities had opened the way to more uniform practice. Whereas in the past decisions had to be made by individuals, or small groups of people, now a wealth of knowledge and experience were pooled under the direction of a central authority to pave the way for sound advance.

It was wrongly believed that the Electricity (Supply) Act, 1926, would greatly reduce the amount of generating plant needed. Consequently many young engineers turned away from the supply section of the industry. The resulting effect was only now being fully felt. Prospects of promotion and advancement would be much greater in the larger organization, wherein ability and merit combined with a known record would be the deciding factor instead of the former chancy selection by a single interview.

Finally, Mr. Daniel mentioned his Sub-Centre address of two years ago in which he made reference to compulsory registration for those employed on electrical wiring as he considered, and still does, that this work should only be in the hands of those who had been properly trained and who had available appropriate tools and instruments for making a sound installation. It was fortunate that fatalities from bad electrical work were exceedingly few, but there were no records of the amount of inconvenience to consumers and the inefficient use of circuits due to bad workmanship.

The ever-increasing use of electricity for many varied purposes increased the risk inherent in bad workmanship and any action which resulted in sound installations all over the country was fully justified. Whether such action resulted in compulsory registration, or not, there would always be a need for installations to be examined as they progressed and before the faulty parts were covered up, as distinct from the tests applied by the supply authority, to ensure that even the hidden work was done on sound engineering lines.

Scottish Electricity Fair

THE South-West Scotland Electricity Board recently staged a three-day Electricity Fair at the Town Hall, Clydebank. The main hall of the building housed a display of domestic appliances arranged in several sections, having themes such as "Hubby's Hobbies," "Gardeners' Corner" and "Housewife's Dream." In the lesser hall film-shows took place almost continuously, catering for parties of schoolchildren each morning, for the ladies in the afternoons and a mixed audience at night. Included among the electrical films were documentaries dealing with shipbuilding and marine engineering—subjects of particular interest to Clydesiders. Another part of the building was devoted to cooking, washing and other housecraft demonstrations.

An amusing event was a cookery competition for husbands. By contrast, the final of a schoolgirls' cookery competition was a serious affair. On a stage decorated to represent a large kitchen twelve schoolgirls, each with her own electric cooker, competed to produce a sample dish.

The Fair concluded with a full-scale theatre show entitled "Service with a Smile and a Song," which was devised and presented entirely by the Electricity Board's staff.

Standby Diesel-Electric Sets

SIMPLIFIED PARALLELING WITH MAIN SUPPLY SYSTEMS

It will be recalled that the probability of the power cuts of 1947 persisting for some years caused the Government to facilitate the manufacture of 300,000 kW of standardized diesel-generating plant valued at £10,000,000, for factory standby use. The production of half the sets required for the official programme was undertaken by Davey, Paxman and Co., Ltd., of Colchester, who requested the co-operation of the British Thomson-Houston Co., Ltd., in the manufacture of a large proportion of the biggest alternators, 50 c/s three-phase rated at 330 kVA, 1,000 r.p.m., 400/440 V. They are of special design to allow of rapid production in a factory already heavily committed in other respects. Simplified synchronizing, speed governing and power factor control enable them to be paralleled with no more skill than is needed for the operation of synchronous motors.

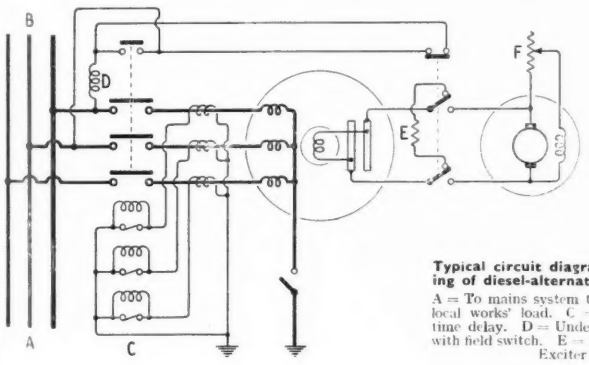
The speed of the diesel-generator is raised until the tachometer pointer reaches a mark on the scale; next the stator circuit-breaker is closed and then the field switch; an interlock prevents closing in the wrong order. The set is now fully ready to carry load. The accompanying circuit diagram shows that simple protection is all that is considered necessary. The load is maintained at its set value independently of variations of the supply system frequency by the speed governor being rendered inoperative, which is easily done by increasing the pressure on the control spring, so moving the governor weights inwards to the stop. The governor is still available to limit the speed to a safe value in the event of the circuit-breaker tripping and the loss of the synchronous tie.

During the last two years Davey, Paxman sets have been installed by a variety of industries, and sets have been supplied to the Canary Islands and the remote Faroe Islands. A further fifty of the B.T.H. 330 kVA sets now in course of manufacture are additional to those called for in the original contract.

The urgency of the initial delivery presented problems in manufacture, and a design was evolved which utilizes the maximum of punched, pressed and fabricated parts. The use of endshields on the alternators was avoided because of the machine-tool work involved; a pedestal design is employed and there is no machining of the stator frames, which are of the "clamped-up" type. The stator core laminations are assembled between side plates round a central drum before clamping by through bolts The pre-machined feet are correctly positioned relative to the side plates by means of an assembly jig before being welded in position.

The wave-connected bar-type stator windings are arranged in open slots, allowing preformed and pre-insulated coils to be used. All the end clips are placed in position and soldered in one operation by lowering the end windings into a large solder pot.

The rotor bodies are constructed of $\frac{1}{8}$ in laminations, to eliminate forgings which took a long time to deliver and required machining. The poles are dovetailed to the rotor body, the pole end plates being of steel, punched to shape and having rivet holes punched in them before final bending with a die. The shafts are machined from stock hammered bar and



Typical circuit diagram for simplified paralleling of diesel-alternator with the supply mains

A = To mains system through transformer. B = To local works' load. C = Over-current trip coils with time delay. D = Under-voltage trip coil interlocked with field switch. E = Field discharge resistor. F = Exciter field rheostat

the rotor bodies pressed on, a few plates at a time, by a hydraulic press.

The field coils are wound directly on to the insulated poles, each of the flanges at the top and bottom being moulded in one piece. The short-circuiting segments joining the pole-face damper bars are punched from copper plate, four of the punched segments being brazed to the bars at the ends of each pole.

The protection caps for the stator end windings are of sheet steel and supplied ready for fitting. The perforated slip-ring covers and solid and perforated stator wrapper plates are also supplied ready for use. The base plates, on which both alternator and exciter are mounted, are fabricated of broad-flanged beams. Each set can be lifted by means of four drop-forged lugs, welded to the alternator stator frame.

Ferromagnetic Materials

Two-day Symposium at the I.E.E.

ON Monday and Tuesday of last week the Measurements Section of the I.E.E. held a series of meetings at which an extremely interesting symposium of papers was presented on the properties, testing, application and development of ferromagnetic materials. There were six main and fourteen supporting papers, and of the total, ten had already been read at previous meetings and published either in the Proceedings or Journal of the Institution.

The opening address was delivered on Monday afternoon by Professor E. B. Moullin (President), and under the chairmanship of Professor J. Greig a paper investigating the eddy-current anomaly in electrical sheet steels was subsequently presented by Dr. F. Brailsford (Metropolitan-Vickers). He discussed the well-known discrepancy between the calculated and experimentally observed value of eddy-current losses at 50 c/s and showed that the effect of flux waveform distortion due to magnetic non-uniformity was small.

From experiments on a model, however, it was indicated that this distortion with alternating magnetization was severe enough to cause the hysteresis loss per cycle to be strongly frequency-dependent. On the other hand, the discrepancy occurring with alternating magnetization was found to be absent with a pure rotational flux where there were no waveform effects. Dr. Brailsford concluded that the observed anomaly might be due to the increased hysteresis loss caused by internal flux waveform distortion, the true eddy-current loss being about the same as the calculated value.

In the first supporting paper Dr. L. R. Blake dealt with the eddy-current anomaly in ferromagnetic laminæ at high rates of change of flux. Normally, the loss in such material undergoing magnetization was regarded as the sum of a measured hysteresis loss and a calculated eddy-current loss. For some sheet steels the measured loss was greatly in excess of this sum, and after discussing the discrepancy the author concluded that, among other things, it could partly be caused by a variation of permeability and resistivity across the lamination thickness.

Mr. K. H. Stewart (Cavendish Laboratory, Cambridge) then described and discussed the interpretation of experiments on the magnetic losses in sheet steel at power frequencies and flux densities, concluding that an important fraction of the total loss in low-loss sheet could not be accounted for by normal methods. Mr. Stewart thought this loss was due to the finite velocity of domain wall movements, but it was not clear what mechanism limited this velocity. Microscopic eddy-currents induced by the wall movement were suggested as a possible cause.

The effects of overlapping joints in laminated magnetic cores on the m.m.f. and power required for their a.c. magnetization at power and audio frequencies were then discussed by Mr. O. I. Butler and Dr. C. Y. Mang. The authors also presented a second paper dealing with the predetermination of the magnetic properties of laminæ within the same range of frequencies and described some experimental methods and tests for achieving that end.

In the evening, under the chairmanship of Dr. G. A. V. Sowter, Mr. W. F. Randall and Dr. H. H. Schofield (Telegraph Construction & Maintenance Co.) presented the first of the two main papers and dealt with some of the metallurgical and structural factors which affect the properties of soft magnetic materials. The factors considered were composition, purity, non-metallic inclusions, strain content, structural orientation, grain size and shape, lattice ordering, magnetic domain orientation, surface conditions and dimensional effects. The incidence and control of these factors in manufacture was discussed with particular reference to their effect on magnetic properties and as they influenced the latter in different ways, necessitating adjustment of production methods; this fact was duly emphasized.

Laminated Cores

The development of line communication systems has made increasingly exacting demands on magnetic materials and cores for transformers. Furthermore, the published data appropriate to the frequencies and inductions usual in this field are inadequate and unreliable for design purposes, thus leading to inconsistency and excessive factory rejections. With this in mind Mr. R. J. Halsey (Post Office Research) dealt with the use of laminated ferromagnetic cores at very low inductions. He first set out the theoretical performance for homogeneous material and then compared it with test results on typical specimens, but unfortunately most of the data were not statistical. Results were given for the initial permeability and eddy-current losses of single ring stampings and the effects of stacking examined. Corresponding measurements followed on single turns of strip and spiral cores leading to an investigation of inter-laminar insulation and the effects of cutting to form C-type cores. Finally, some typical measured values of hysteresis and residual loss coefficients were given for the materials concerned.

The observed anisotropy of oriented polycrystalline silicon-iron sheet was then considered by Mr. A. E. De Barr, with reference to the results of crystal physics and it was shown that while the material could be regarded as homogeneous, good agreement was obtained between theory and experimental results on the oriental sheet. An equivalent model was described which closely simulated the observed properties of the sheet. The application of the domain theory of ferromagnetism to the anisotropy of magnetic properties was discussed, and it was suggested that the problems arising might be explained by considering the actual domain configuration of the material. Experimental results on hysteresis loss, permeability, magnetostriction, etc., for oriented sheet were considered in relation to the domain changes which occurred during magnetization. In conclusion, the more complex phenomena occurring during a.c. magnetization were discussed with regard to the simpler magnetic properties mentioned earlier.

Measurements of magnetostriction and permeability of samples of hot- and cold-rolled silicon steels before and after abrasion in different directions relative to the applied field were given by Mr. R. G. Martindale. He showed that surface abrasion produced high internal strains of a markedly directional nature which affected the magnetic properties, the results being interpreted in terms of the domain theory of ferromagnetism.

Materials Used in Transductors

In the final paper of the day Mr. L. F. Borg spoke on some aspects of magnetic materials used in transductors, commencing by describing the mode of operation of a simple transductor connection. He discussed the influence of the different properties of the iron core upon the mode of operation and the characteristics of the device, formulating the requirements and proposing a practical figure of merit.

Under the chairmanship of Dr. W. G. Radley on Tuesday, Mr. W. S. Melville (B.T.H. Co.) dealt with the measurement and calculation of the pulse magnetization characteristics of nickel irons from 0.1 to 5 microseconds. The paper was supplementary to a previous one by the same author and it treated some aspects of the subject in greater detail. Methods and techniques of measurement were discussed and a description given of apparatus and some measuring components which were used in carrying out tests on carefully prepared samples of "Radiometal," "Rhometal" and "Mumetal," wound from rolled strip having

thicknesses of 0.001 to 0.01in. Pulse permeability and loss characteristics for several pulse durations and values of d.c. polarizing field were shown and the effects of these variables on pulse performance were discussed. A conception of the mechanism of pulse magnetization was put forward and a method was derived for determining analytically the theoretical magnitude of eddy-currents and losses for any form of pulse which could be represented by a finite number of linear voltage changes. The results obtained by this method were compared with practical values.

Incremental Magnetic Properties

Messrs. R. O. Carter and D. L. Richards then presented a supporting paper on the incremental magnetic properties of silicon-iron alloys with particular reference to the design of air-gapped smoothing chokes. After a brief review of the fundamental considerations involved in defining the incremental magnetic properties of a material, the authors described some methods of measuring the same. Measured values at 50 c/s and 800 c/s for the various grades of hot-rolled silicon-iron in common use were tabulated. It was shown that the apparent reluctivity of a magnetic circuit with an air gap which is optimum for the particular conditions of incremental magnetization could be related to the apparent polarizing magnetizing force by an empirical equation. This was accurate enough for most practical cases and its use enabled a purely analytical method of design of air-gapped smoothing chokes to be evolved.

Using the mathematical results of Butler and Mang, Mr. O. I. Butler (Sheffield University) spoke of the polarization phenomena in nickel iron alloys at power and audio frequencies and discussed methods to assist in their effective elimination. After this Mr. N. F. Astbury dealt with some aspects of the theory of iron testing by wattmeter and bridge methods, proposing a new circuit. The concept of complex permeability was introduced as an approach to bridge measurements and an equivalent circuit for a test transformer was deduced. It was shown how this could be used in a novel circuit in such a way as to eliminate copper losses. The limitations of the bridge method were briefly discussed and the relation to bridge and wattmeter methods was shown to lead to the concept of "distortion coefficient," a new characteristic property of the iron, which could be determined experimentally and might provide a succinct approach to distortion problems.

Mr. O. I. Butler then returned, stressing the need for the development of a standardized commercial method of iron loss measurement, and to assist this end he investigated the use of a miniature reproduction of the standard Lloyd-Fisher square. In comparing the results obtained on the miniature square with those obtained on the standard square it was found that the hardening effect near the edges of the material due to cutting was increased and might amount to 5 per cent on the total loss. However, the results from the miniature square were probably more representative of practical cases at audio frequencies. Since the proportionate mass of the overlapping portion in the magnetic square was quite appreciable its effect was considered in some detail. It was also shown that the relation given in B.S.601:1935 between the loss per unit mass and the total loss measured on the standard square at power frequencies was applicable to the miniature square at power and higher frequencies.

Testing Transformer Steels

A paper describing the application of an a.c./d.c. null wattmeter method to the routine testing of transformer steels was then delivered by Messrs. N. F. Astbury, T. Emmerson and J. McFarlane. In this arrangement the wattmeter circuit was incorporated with computing networks in such a way that the operator was confined to the insertion of basic data and the establishment of a series of four null balances. Use was made of an a.c. peak fluxmeter in establishing the conditions of test, and compensation was made automatically for circuit losses and air-flux corrections. The method of setting up and calibrating the equipment was also briefly described.

Dr. S. Whitehead took the chair in the evening when the first paper, prepared by Messrs. C. E. Richards, S. E. Buckley, P. R. Bardell and A. C. Lynch, on some properties and tests of magnetic powders and powder cores, was presented. A

report on the electric and magnetic properties of, and the applications of, different ferrite materials was then given by Dr. D. Polder (Philips Research Laboratories, Eindhoven), and in the subsequent supporting paper Dr. K. E. Latimer and Mr. H. B. Macdonald surveyed the possible applications of ferrites. The general mechanical and magnetic properties of these materials were described, manganese-zinc ferrite in particular, and the types of engineering application for which they appeared to be suitable were discussed. Data were presented to show what could be done in the field of filter coil and h.f. transformer design.

The last paper of the symposium was read by Mr. W. H. B. Cooper, who considered the operation of inductors and transformers in terms of field impedance. He said that electric circuit theory had been so developed that there was a tendency to overlook the Maxwellian idea that the conductors of a circuit served only as a guide for the energy which resided mainly in the surrounding media. A generator supplying its load through a transformer was quoted as an example from which it was evident that energy was propagated from primary to secondary in the form of an electromagnetic wave. The mechanism of this transfer was identical with that of wave propagation either along lines or through a continuous medium, and the author attempted to view the operation of inductors and transformers in this light. This approach led to an equivalent circuit which was very general and reduced to the usually accepted circuit as a special case.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Sales Engineers

AS a design engineer on varied electrical work in a group of factories operated by a large industrial company, I receive many visits from the sales engineers of numerous manufacturers and I am continually surprised by the generally low standard of salesmanship presented by those representatives. Few of them have any natural aptitude in the art; many are technically ignorant and unable to discuss intelligently this aspect of the products they are handling. Almost any query must be referred to their works and my experience indicates that in most cases, their visits are a waste of both their firms' and my time.

I wonder if others of your readers would agree that manufacturers generally show a woeful lack of care in the selection and training of these important members of their staff? SURPRISED.

Rural Electricity Supply

ON page 852 of the *Electrical Review* for 4th November, it is reported that Mr. G. A. Robertson asked the question: "Should the inhabitants (in country districts) be entitled to light, heat and power irrespective of their ability to pay the full cost of providing the supply?" Of course not: but the point is that once again it is made known that the grid system is unable to give supply unless the consumer takes more than he needs, and pays through the nose for it.

What about going back to small, efficient local stations? Meanwhile we stick to our oil lamps, and laugh gently at "master" plans.

T. HEWITT-PAYNE.

Dunmow, Essex.

I.E.E. Utilization Section

AT the Conversazione of the Utilization Section of the Institution of Electrical Engineers to be held at the Institution on 25th November, there will be a number of demonstrations and exhibitions including electro-medical equipment, a display of fluorescent effects and materials and high-speed flash equipment, an agricultural exhibit including working scale models, as well as five "audience participation" items and a film show. A running buffet will be in operation throughout the evening and tickets are still available to members of the Utilization Section and their guests at 12s 6d per head.

Next Week's Events

Monday, 21st November

BIRMINGHAM.—Imperial Hotel, 6 p.m. I.E.E. South Midland Supply and Utilization Group. "Waterworks Power Plant Practice: The Comparative Costs of Steam-, Diesel- and Electrically-Operated Machinery," by T. P. Wakeford.

Midlands Electricity Board Service Centre, Paradise Street, 7 p.m. E.P.E.A. Midland Technical Group. "Bus Bar Zone Protection," by H. Hurst.

CAMBRIDGE.—Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. Joint meeting with the Cambridge University Wireless Society.

LIVERPOOL.—At the Liverpool Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "The Phase/Neutral System of Supply for Rural h.v. Distribution," by G. T. Garwood and G. J. Websdale.

LONDON.—Savoy Place, London, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on "Discussions" to be opened by C. O. Boyse.

I.E.E. London Students' Section, 9.15 p.m. Visit to the Daily News, Ltd., E.C.4.

St. Ermins Hotel, S.W.1, 6.50 p.m. A.S.E.E. Central London Branch. "Television," by J. B. Kaye.

At the Royal Institute of British Architects, Portland Place, W.1., 5.45 p.m. Institute of Transport. "Some Thoughts on Railway Motive Power," by Sir Eustace Missenden.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Lecture on "Testing of Power Station Steam Plant," by P. G. Lloyd.

NOTTINGHAM.—Gas Showrooms, Parliament Street, 6.30 p.m. Nottingham Society of Engineers. "A Brief Review of Railway Signalling," by J. C. Boustead. (Joint meeting with the Derby Society of Engineers.)

STOCKPORT.—White Lion Hotel, 8 p.m. A.S.E.E. Stockport Branch. Lecturettes by Branch members.

SWANSEA.—Plaza Cinema, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Overhead Line Regulations," by H. W. Grimmitt. (Joint meeting with the Western Supply Group.)

Tuesday, 22nd November

GLASGOW.—Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, 7 p.m. I.E.E. Scottish Centre. Lecture on "Some Electromagnetic Problems," by Professor G. W. O. Howe.

LONDON.—Savoy Place, London, W.C.2, 5.30 p.m. I.E.E. Measurements Section. Discussion on "The Electrical Measurement of Strain," to be opened by Dr. F. Aughtie.

LUTON.—Chamber of Commerce, George Street West, 7.30 p.m. Luton Electrical Society. "Electricity in Horticulture," by C. A. Cameron Brown.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. Discussion on "The Commissioning of Generating Stations," to be opened by F. J. Hutchinson. (Joint meeting with the North-Western Utilization Group.)

Wednesday, 23rd November

COVENTRY.—G.E.C. Telephone Works, 7 p.m. I.E.E. South Midland Students' Section. "Aircraft Electrics," by D. Pike.

Technical College, The Butts, 7 p.m. A.S.E.E. Coventry Branch. "Switchgear for Power Supplies," by W. E. Wilson.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "The Phase/Neutral System of Supply for Rural h.v. Distribution," by G. T. Garwood and G. J. Websdale.

NEWCASTLE-ON-TYNE.—Royal Station Hotel. I.E.E. North-Eastern Centre. Jubilee dinner and visit of President.

Oxford Galleries, 8 p.m. I.E.E. North-Eastern Students' Section. Annual dance.

SHEFFIELD.—Royal Victoria Hotel, 7 p.m. I.E.E. Sheffield Sub-Centre. (Joint meeting with the Yorkshire Branch I.Mech.E.) "World Energy Resources and their Utilization," by Dr. A. Parker.

Thursday, 24th November

BRISTOL.—Electricity House, Colston Avenue, 7 p.m. I.E.E. Bristol Students' Section. "Rectification for Power Plant," by S. R. Phelps.

KETTERING.—George Hotel, 7.30 p.m. I.E.E. East Midland Centre. Lecture on "Some Aspects of Agricultural and Horticultural Electrification in North America," by F. E. Rowland.

LUTON.—George Hotel, George Street, 7.45 p.m. A.S.E.E. St. Albans Branch. "Electronics as applied to Industry," by K. A. Zandstra.

TORQUAY.—Electricity Offices, Union Street, 3 p.m. I.E.E South-Western Sub-Centre. "Overhead Line Regulations," by H. W. Grimmitt.

Friday, 25th November

LEEDS.—Queen's Hotel, 7 p.m. I.E.E. North Midland Centre. Annual dinner.

LONDON.—Savoy Place, London, W.C.2, 6 p.m. I.E.E. Utilization Section. Section conversazione.

STOKE-ON-TRENT.—Electricity Showrooms, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "The Measurement of Light and Colour," by G. T. Winch.

Saturday, 26th November

LONDON.—I.E.E. London Students' Section, 10 a.m. Visit to Chadwell Heath Sub-station, British Railways.

Television Servicing Examination

THE Radio Trades Examination Board and the City and Guilds of London Institute announce that the first Television Servicing Certificate Examination will be held on 2nd and 4th May, 1950, and the practical examination on a date to be announced later. The closing date for the examination is 15th December. Entry forms are obtainable on application to the Secretary of the Board, 9, Bedford Square, London, W.C.1.

E.I.B.A. Ball

Attendance of Over Six Hundred at Grosvenor House

THIS year over 1,500 applications were received for tickets for the annual ball of the Electrical Industries' Benevolent Association, but it was possible to accommodate only just over 600. Even so last Friday's ball was a trifle overcrowded, but this interfered very little with the evening's enjoyment, which extended from 8.30 p.m. to about 1.30 a.m. on Saturday. We are informed that next year the Ball will be held in the large ballroom at Grosvenor House which will reduce the number of disappointed applicants.

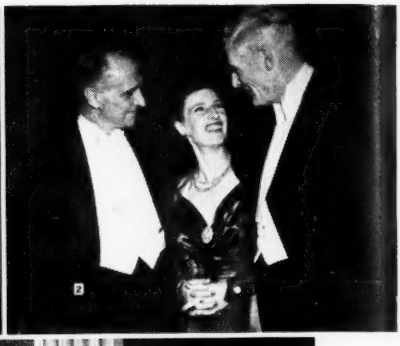
During intervals in the proceedings the company was addressed by the secretary (Mr. H. Senior Fothergill), who thanked the donors of the magnificent collection of prizes which ranged from electric irons and kettles to a refrigerator and television set. Mr. E. C. Holroyde, the president, spoke of the increasing needs of the Association and called for greater and greater support.

Mr. Leslie C. Sharp (chairman) and friends

Mr. H. A. Deacon, Mr. N. V. Everton and party

At the table on the right are Mr. S. F. Steward and Mr. and Mrs. H. F. Carpenter

Members of the "Electrical Review" party



1. Messrs. L. C. Sharp (chairman), H. S. Fothergill (secretary) and E. C. Holroyde (president). 2. Mr. H. Nimmo with Mrs. Robson and Mr. Harold Hobson. 3. Mr. S. C. Hurry, Mrs. H. F. Carpenter and Mr. R. H. Coates. 4. Mr. E. R. Wilkinson with Lame Caroline Haslett

A sum of £239 (over £100 more than last year) was received from the sale of programmes, and the "penny" collection resulted in a further £88 (against £79 last year). Much excitement was aroused by the allocation of the prizes.

Music was provided by Cyril Stapleton's orchestra and Paul Heiman's band, and an excellent cabaret show was presented by Anne Ziegler and Webster Booth, the Kermond Brothers and Michael Bentine.

Southern Board's Junior Engineers

THE first convention for graduate trainees and junior engineers was recently held at the headquarters of the Southern Electricity Board and was attended by fourteen graduates and eight junior engineers from the whole area, together with thirty-five other personnel from local districts. Dr. A. G. Beverstock, the Board's education officer, dealt in his introductory address with the development of large-scale organization as a possible logical consequence of social and economic changes during the last century. The importance of the personnel function in a nationalized organization was stressed and an outline was given of the historical development of negotiating and advisory machinery in the supply industry. A comprehensive series of lectures followed which dealt with "Overhead Lines and Rural Development" (Mr. K. L. May), "District Organization and Administration" (Mr. J. L. Taylor), "System Planning" (Mr. R. H. Abell), "Switchgear and Protective Gear" (Mr. R. A. Woods), "Agricultural Development" (Mr. H. R. J. Baigent). During the convention a graduate society was formed.

Commerce and Industry

Purchase Tax on Water Heaters
Non-Ferrous Metal Controls

THE Treasury gives notice that it proposes to make an Order under Section 21 of the Finance Act, 1948, to reduce purchase tax on thermal storage water heaters suitable for operation from electric mains from 100 per cent to 66⅔ per cent and to exempt from tax instantaneous water heaters not suitable for operation from electric or gas mains. Any representations which interested parties desire to make should be made in writing to the Commissioners of Customs and Excise, City Gate House, Finsbury Square, E.C.2, not later than 25th November.

Census of Production

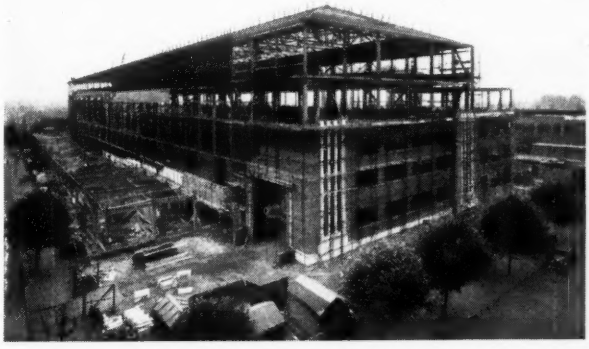
An Order prescribing the matters about which persons may be required to furnish returns for the Census of Production to be taken in 1950, in relation to the year 1949, has been made by the Board of Trade to come into operation on 31st December next. The Order also exempts undertakings covering the production of coal, gas, electricity, oil shale, crude or refined petroleum or shale oil products from making returns to the extent to which they supply such information to the Minister of Fuel and Power under Section 1 of the Statistics of Trade Act, 1947. The title of the Order is "The Census of Production (1950) (Returns and Exempted Persons) Order, 1949" (S.I., 1949, No. 2053; H.M. Stationery Office, price 1d.)

Tool Makers at Canadian Fair

The Gauge and Tool Makers' Association will have a stand of 500 sq ft in the British Tool, Machine Tool and Scientific Instrument Section of the Canadian International Trade Fair at Toronto, Ontario, in May-June, 1950. The stand will take the form of a composite display of gauges and measuring instruments, jigs and fixtures, press tools, engineers' small tools, moulds and dies, and diamond tools, manufactured by the members of the Association, together with supplies of catalogues and other sales literature. The secretary of the Association, Mr. G. T. Beach, will be on duty on the stand throughout the Fair.

G.E.C. Witton Extensions

Good progress is being made with the work on the extensions to the engineering works at Witton of the General Electric Co., Ltd., the cost of which will be in the neighbourhood of £1,000,000. Work was commenced about nine months ago, and when the building is completed it will add 100,000 sq ft of floor space. Although the British Electricity Authority has at present standardized on 30 MW and 60 MW sets for its present programme, future requirements are likely to call for sets up to 100 MW, and the new building will place the company in a position to meet all demands for such plant. It is anticipated that production in the new shop will begin this year, although it will be some months before it is in full production. The present stage of construction of the new building is shown in the accompanying picture.



Extensions to the G.E.C. Witton Works, which are well advanced

Zinc Price Increase

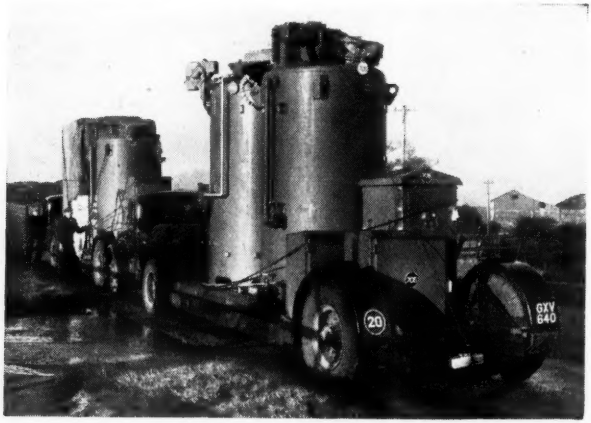
The Ministry of Supply announces that from 10th November the price of good

ordinary brand zinc has been increased by £2 from £85 10s to £87 10s per ton, delivered. Prices for other grades are varied accordingly.

The zinc oxide manufacturers announce that from the same date the prices of zinc oxide, in lots of not less than two tons, delivered buyers' premises, have been increased by £1 15s. The new prices are: Zinc oxide (red seal), £84; zinc oxide (green seal) £85 10s.; zinc oxide (white seal), £86 10s.

Circuit Breakers for 132 kV Service

Ferguson. Pailin, Ltd., are supplying a number of their type "XOP 60" oil circuit



Oil circuit breakers for the North of Scotland Hydro-Electric Board

breakers for 132 kV service to the North of Scotland Hydro-Electric Board. In the accompanying picture we show one of the consignments on the road to its destination, Beauly, Inverness.

E.I.B.A. Birmingham Branch

The Electrical Industries Benevolent Association Birmingham Branch luncheon and annual general meeting will take place on 8th December at the Midland Hotel, Birmingham. Applications for tickets (15s each, exclusive of wines) should be made immediately to the hon. general secretary, Mr. L. Wall, Electrical Components, Ltd., 102, Snow Hill, Birmingham, 4.

"Darkness into Daylight"

A special lecture-demonstration to celebrate 100 years of electric light was given by Mr. L. J. Davies, director of research and education with the British Thomson-Houston Co., Ltd., at the Albert Hall, Nottingham, on Tuesday last. Mr. Davies called his lecture "Darkness into Daylight," and dealt with the development of filament lamps, fluorescent lighting, photographic lighting, and high-speed colour films. The lecture was arranged by the Central England Area of the Lighting Service Bureau.

Mechanical Handling Exhibition

The provisional programme of subjects to be discussed at the second Mechanical Handling Exhibition and Convention at Olympia, London, from 6th to 17th June, 1950, is now announced. There will be 800 seats in the convention hall in the gallery of the National Hall, Olympia, and tickets, available on application beforehand, will be free. In another hall in the gallery films will be shown. The whole of the exhibits will be on the ground floor level of the Grand and National Halls, Olympia. About 80 per cent of the space has already been taken and the exhibits will cover the full range of equipment for the handling, lifting, stacking and short-distance transportation of goods. The Exhibition and Convention are organized by *Mechanical Handling*, Dorset House, Stamford Street, S.E.1, and overseas visitors are invited to communicate beforehand with the editor.

Subjects which will be dealt with at the Convention will include British practice covering electrical equipment on cranes, and control of electric power and sequence flow in materials handling.

B.T.H. Crown House Display

The current window display at Crown House, Aldwych, London, by the British Thomson-Houston Co., Ltd., is a selection of a.c. electric motor control gear and includes representative types of direct-on three-phase contactor starters and various other control units (including push-buttons, float switches, pressure switches, lever-operated master switches) and a low-voltage lighting set designed to operate from the 400/440 V power supply and provide a safe low-voltage (50 V or 25 V) for local lighting in factories. In the centre of the display is a

large photograph of B.T.H. class UMC (unit motor control) equipment installed in a large chemical works.

Fuel Economy Committees Disbanded

Mr. Gaitskell, the Minister of Fuel, has written to the 700 local fuel economy committees set up last year saying that he does not feel justified in asking them to continue their services. He says that while fuel conservation and care in the use of electricity remain important, the organization of the industry has reached the point where the electricity authority can now take over the promotion of fuel economy. Local women's organizations are to continue their work in stimulating interest in fuel economy.

Damages Claims

A claim for personal damages brought by a linesman against the North Eastern Electricity Board was dismissed with costs at Durham Assizes recently. Mr. Justice Stables said he was satisfied that the linesman, Peter Stewart (55), of Bishop Auckland, had not taken reasonable precautions to ensure that his ladder, with snow on the ground, was firmly secured.

At the Scottish Court of Session, Adam Young Munro, electrician, of Leith, claimed £1,000 from Henry Robb, Ltd., Leith, in respect of injuries which he sustained when he fell from a roof. He stated that he had been working on overhead electric lines and contended that the defendants had failed to provide a safe system of working on the roof. Defendants denied liability and contended that plaintiff failed to take elementary precautions for his own safety. The jury apportioned two-thirds of the blame to the plaintiff and one-third to defendants and assessed total damages at £400.

Contractors' Problems

Speaking at the annual conference of the South Eastern Section of the Electrical Contractors' Association last week, the president of the Association, Mr. S. Dickinson, said that several major problems confronted electrical contractors. They had just concluded an agreement with the British Electricity Authority intended to secure fair play and just dealings in connection with the Electricity Boards' contracting departments. He hoped that the agreement would be observed by the Boards.

Referring to the recent demand from the E.T.U. for a wages increase, he said that unions throughout the country were demanding more and more without any regard to the economic policy of the country. The rank and file demanded concessions with complete disregard of the national economy. There was far too much "spoon-feeding" of their operatives. After referring to the "truculent attitude" of some workers, he said: "We must see a changed attitude of our labour in respect to our customers."

Change of Address

The Luton District office of the Eastern Electricity Board has removed to 487, Dunstable Road, Luton (telephone, Luton 4000).

Mobile Shop

Kinning Park Co-operative Society has recently put into service a mobile bread and grocery shop, built by S.C.W.S., of Glasgow, on a Morrison-Electricar 40 cwt chassis. This mobile shop is operated by one man. Customers enter at the rear, select their purchases as they pass down a central gangway between provision-stocked shelves, and pay at a small counter behind the driver's seat. Then they leave through the nearside front door. This mobile shop, which is proving very successful, runs a 22-mile circuit five days a week.

"Co-op" bread and grocery shop on a Morrison-Electricar chassis

Rural Distribution

An error unfortunately occurred in the abstract, in our 4th November issue, of the chairman's address to the North Lancashire Sub-Centre of the I.E.E. In the section headed "Keeping Down Costs" the statement that there is room for both single- and three-phase systems, "the latter for . . .," is not correct, as it was Mr. G. A. Robertson's intention to indicate that the former (single-phase) system was the more appropriate to sparsely populated areas.

Non-Ferrous Metal Controls

Under an order which came into force on 15th November the Minister of Supply has consolidated all previous control of non-ferrous metals (copper, lead and zinc) orders; freed from control the acquisition and disposal of copper and zinc scrap; and revoked the old statutory maximum prices of copper, lead and zinc. Although licences will no longer be required to acquire and dispose of scrap copper and zinc, they will still be needed for scrap lead owing to the rationing scheme. Licences will still be required for unwrought forms of the three metals.

Tin Control Ends

The Minister of Supply has made the Control of Tin (No. 6) (Revocation) Order, 1949, which frees tin from his control from 15th November, the date on which the London Metal Exchange resumes dealings in tin. The Ministry's published prices have been withdrawn from that date, and consumers in the United Kingdom do not now require a licence to acquire tin. They should obtain their supplies through commercial channels.

Educational

The third issue of that well produced little booklet, the "Bulletin of Electrical Engineering Education" has just been published by the College of Technology, Manchester. Originally, its publication depended upon funds provided by the Governors of the College, but to assist its early development the Council of the Institution of Electrical Engineers has made a grant towards its maintenance for a limited period so that future copies will be issued on a subscription basis. To bring the "Bulletin" within the reach of individual teachers as well as educational establishments, the subscription will be 10s 6d a year, for a minimum of two issues, starting with the fourth. Full particulars can be obtained from the organizer, Mr. E. Bradshaw, at the above address.

Trade Announcements

Mr. L. Newman has been appointed representative for **Aerialite, Ltd.,** for North East London, Norwich, Huntingdon, Cambridge, Suffolk and Hertfordshire. He succeeds Mr. W. Burrows who was recently with the company.

A new window display, measuring 10ft by 7ft, has been designed by **Sobell Industries, Ltd.,** for its radio and television receivers. Details of loan facilities can be obtained from the company's Publicity Department, Langley Park, Slough, Bucks. The company has appointed a number of wholesalers as distributors of its receivers, covering the British Isles.

Mr. J. A. Piejus has been appointed sales representative for **J. H. Tucker & Co., Ltd.,** in the Eastern Counties area comprising Cambridge, Bedford, Northants, Norfolk, Suffolk, Huntingdon, Oxford, Bucks, excluding the town of Slough; Hertfordshire excluding the towns of Barnet, St. Albans and Watford; and Essex, excluding the towns of Romford, Purfleet and Tilbury.

Mr. A. E. Bishop, who was for nearly twenty years with H. R. Cleave & Co., has joined **T. M. C. Harwell (Sales), Ltd.,** as representative for the sale of "Temco" wiring accessories and synchronous clocks, in the Midlands and South Wales.

Catalogues and Lists

Tufnol, Ltd., Perry Barr, Birmingham, 22B.—Technical brochure dealing with the properties of "Tufnol" sheet, tubes and rods.

Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Technical brochure on special valves and electronic devices for research and industry.

Standard Telephones & Cables, Ltd., Rectifier Division, Warwick Road, Boreham Wood, Herts.—Two technical brochures (F/SRT.6) on single-phase medium current rectifiers and (F/SRT5) on low current tubular rectifiers.

Baldwin Instrument Co., Ltd., Brooklands Works, Dartford, Kent.—Five technical leaflets describing a gamma radiation detector, electrometer-voltmeter, integrating light-counter, decade resistance boxes and a wide-range resistance bridge.

Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.—Priced folder on domestic refrigerators.

Linolite, Ltd., 158, Bishopsgate, London, E.C.2.—Leaflet (B.2) describing "Linora" fluorescent reflectors for shop window, showcase and display lighting.

Nagard, Ltd., 245, Brixton Road, London, S.W.9.—Brochure on the company's type 103 oscilloscope and associated equipment.

Micramatic, Ltd., Meico Works, Congleton, Cheshire.—Priced folder on fluorescent lighting fittings for commercial and industrial use.

Samuel Fox & Co., Ltd., Stockbridge Works, Nr. Sheffield.—Technical brochure on "Red Fox" electrical resistance alloys.

Thorn Electrical Industries, Ltd., Judd Street, London, W.C.1.—Leaflet (AL/66) on 3ft and 4ft fluorescent batten fittings.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Illustrated technical brochure on infra-red electric heating.

Industry and the House

Debate on Coal Board's Report

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

THE advocates of nationalization have always claimed that one of its benefits would be that the public would secure more control over a nationalized industry than when it had been in private hands. They inferred that the control would be exercised through Parliament. In fact, it has been extremely difficult for M.P.s to make any reference in the House to the work of the national Boards, because questions relating to day-to-day management are ruled out of order as not being the direct responsibility of the Minister. On Supply Days, it is true, when the work of a Minister's Department is generally discussed, reference can be made to the work of the Boards for which he is the sponsor.

Socialist Ministers have said that the annual reports of the Boards would be debated. But four years of the life of this Parliament have elapsed before time could be found for the first of these debates to take place.

One Day Inadequate

Appropriately enough, it was the report of the National Coal Board which was the first to be debated—on Thursday of last week—and the debate showed how inadequate a debate lasting only one day must be as a means of giving John Citizen a "say" in the working of a great nationalized industry.

The Minister of Fuel and Power, Mr. Gaitskell, hoped that the occasion would be like a meeting of shareholders, but such a conception did less than justice to the public as consumers, as distinct from "shareholders." The debate was more properly a meeting of employees' representatives. Of the six Labour backbenchers who spoke, five were ex-miners or represented mining divisions. The sixth was Mr. Edelman, one of the Coventry M.P.s. The six Opposition backbench speakers included Lt.-Col. Vane (Westmorland), who spoke about pit props, and Mr. Pickthorn, who represents Cambridge University. Colonel Clarke voiced the views of distributors and industrial users, while Colonel Lancaster provided a massive criticism of the present structure of the Board. As individuals they did their best, but no one could claim that the public had had a full representation in Parliament of their views and hopes concerning the coal industry. Indeed, in winding up, Mr. Robens, the Parliamentary Secretary, confessed "to a feeling of great disappointment."

Forthcoming B.E.A. Report

As was announced in reply to a recent Parliamentary question, the first report of the British Electricity Authority will be published shortly. The Government has not yet said whether it will provide an occasion for debating it. If the Coal Board debate has set the standard, the electricity supply industry and the public should not expect too much.

The progress being made with the new television transmitter at Sutton Coldfield has caused M.P.s to wonder when their own constituents will be able to receive televised programmes. Hence the numerous Parliamentary questions on the subject recently, culminating in that of Air-Commodore Vere Harvey, who secured from the Postmaster-General a comprehensive statement about the Government's plans and the rate at which they are to be put into effect. [See "Parliamentary News," next page.] The programme may be affected, however, by the capital cuts.

During the recess an all-party committee on television was set up, and a deputation has called upon both Sir William Haley and the Postmaster-General to urge the rapid construction of new transmitters. If Britain can become the first country in the world to provide 80 per cent of its population (the figure aimed at) with the opportunity of seeing television programmes in their own homes, then the British television system—transmitters, programmes, technicians and receivers—should develop into a most valuable export.

During the debate on devaluation in September, the Chancellor announced a new profits tax of 5 per cent on distributed profits. The short Bill required to give effect to this increase passed through the committee stage and third reading in the House last week. The debates were acrimonious, both sides accusing the other of sinister intentions.

A good deal of confusion was caused, especially during the committee stage, by the various meanings which are assigned to the word "profits." Socialists argued, on the one hand, that all unspent earnings were profits, and on the other that firms must maintain and improve their plant and equipment. But they were silent on where the money was to come from to make this possible, and they repudiated the suggestion that the taxation of a firm's undistributed income was, in fact, a tax on development.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. Turton asked what would be the amount of the reduction in expenditure on rural electrification schemes in the financial years 1949/50 and 1950/51 respectively.

Mr. Robens said that the cut in capital investment by the electricity industry would fall mainly in the sphere of distribution. The precise allocation of the cut would be left to the British Electricity Authority and the Area Boards to determine and while some check on the progress of rural electrification was inevitable, he could not say what reduction in expenditure this would involve. It was, however, unlikely that there would be any reduction in work planned for completion in the financial year 1949/50.

Television Plans

Mr. Wilfred Paling, Postmaster-General, asked by Air Commodore Harvey to state his plans for extending television services to other parts of the country, replied that the provision of a nation-wide television service was being pushed ahead as fast as national economics permitted. The B.B.C. had submitted a plan which had been approved by the Government, but it was, of course, subject to that qualification. The aim was to bring television within the reach of over half the population in less than two years and about 80 per cent of the population by the end of 1954.

The plan provided for five high-power and five low-power stations as follows: *High-power:* Alexandra Palace (London); Sutton Coldfield; Holme Moss (near Huddersfield); Central Scotland; Bristol Channel area (one or possibly two stations). *Low-power:* Tyneside; Southampton; Northern Ireland; Aberdeen; Plymouth.

The Sutton Coldfield station would open on 17th December, and it was hoped to open the Holme Moss station by the middle of 1951. The Scottish station, the Bristol Channel station and the low-power stations would be provided thereafter as soon as circumstances permitted.

Air Commodore Harvey asked the Postmaster General what negotiations had taken place for the interchange of television programmes with European countries.

Mr. Paling said that the only country concerned at present was France. There was a standing liaison committee, representing the B.B.C. and the French broadcasting authority, for promoting programme exchanges. So far these had been limited to films, mainly news reels; interchange of programme producers was under discussion.

Telephone Development

In reply to Mr. Reid, Mr. Paling said that 377,631 telephones were installed during the year ended 31st March, 1939, this being close to the average for the preceding three years. The figure for the twelve months ended 30th September last was 600,401.

No Utility Washing Machine

Mr. Wilkes asked the Minister of Supply whether, in view of the saving of housewives' time and drudgery which electrical washing machines could make, he would consider the manufacturing of a Government-sponsored utility washing machine at a price within the reach of the ordinary housewife.

Mr. George Strauss said that he would not. He did not consider that electric washing machines came within the category of prime necessities, to which the utility scheme was limited.

Economy and Railway Electrification

Mr. Gammans asked the Minister of Transport if he would make a statement on the extent to which cuts in capital expenditure had deferred work on the electrification of lines by the British Transport Commission.

Mr. Alfred Barnes replied that the application of the recent capital cuts to railway works was now being worked out.

Business Efficiency

OPPORTUNITIES FOR INCREASED USE OF ELECTRICITY IN OFFICES

WHILE the electrification of the production side of industry has proceeded rapidly in recent years, the office side has to some extent lagged behind in the adoption of electrical aids to efficiency. At the Business Efficiency Exhibition, held during the past ten days at Olympia, an opportunity has been given of seeing in what ways the balance can be restored. The exhibition closes to-morrow (Saturday).

Inter-office Communication

Intercommunication systems probably provide the greatest scope for labour and time saving. Although these are already widely utilized, new facilities now available greatly enhance their usefulness. "Loud-to-loud" inter-office communication is provided by a new system introduced by Standard Telephones & Cables, Ltd., who show a full range of normal and loudspeaking telephones and interphones; intercall, staff location and fire alarm systems; a private branch exchange; executives' indicator panels; white telephones; and lightweight flat inter-office handpieces in various colours.

"Loud-to-loud" communication on private automatic exchanges is also possible with the Reliance Telephone Company's new "Paxmaster" instrument which, in addition to the normal dial, is fitted with keys to save dialling. A press-button type loudspeaker intercommunication system consisting of one or more loudspeaking master stations and a number of substations is also available, other Reliance products including staff locators, and sound reproducing systems. Among internal telephone systems covering any number of lines, the Automatic Telephone & Electric Co., Ltd., demonstrates a tie-line service giving full communication between two switchboards.

Privacy while telephoning is achieved by the use of a special stand designed so that when the receiver is lifted an "Engaged" sign is illuminated. This, together with various luminous signals, interphones, staff locators etc., is made by Sterdy Telephones, Ltd.

The "Magneta Speakerphone" is proving very popular among doctors and dentists as well as in offices. Its manufacturers, the Magneta Time Co., Ltd., also show public address equipment designed on the unit system. Both intercommunication and sound reproducing equipment are also demonstrated by Dictograph Telephones, Ltd.

Dictaphones are available from the Dictaphone Co., Ltd., in portable types for out-of-office, home or car use, while an alternative method of dictating is provided by a disc-recording instrument made by Thomas A. Edison, Ltd. Visual records are provided by microfilms which Kodak, Ltd., shows with suitable apparatus for viewing them. Facsimile machines have been improved, and one appliance made by Copycat Associated (Marketing), Ltd., with a printing area of 42in by 32in, operates on contact pressure applied by an electrically operated vacuum pump. A new photo-printing machine has been designed by Lambs Rabjohns, Ltd., specially for producing office stationery of all kinds. Many different types of electrically operated duplicators giving 60 to 120 copies a minute are to be seen, as well as printing machines suitable for producing illustrated lists, catalogues, etc., in colour if desired.

The physical effort of typing is almost entirely eliminated by the use of electric typewriters, several makes of which are now available. The model made by the International Time Recording Co., Ltd., is power operated from the ribbon reverse to the carriage return—shift keys, back spacer, tabulator, space bar and all—and it will take up to twenty carbons. Another make shown by British Typewriters, Ltd., incorporates an automatic device for sweeping away eraser dust. Addressing, date stamping, labelling, folding, sealing and franking can all be carried out by electrical methods.

Electrical Accounting Machines

All-electric accounting machines include models equipped with any number up to thirty accumulating registers and, whereas until recently electrical operation controlled only the machine head and carriage movements, the new machines have fully electrified keyboards. A new machine affording high-speed adding and calculating in sterling, avoirdupois, metric or British measurement system is demonstrated by Felt & Tarrant, Ltd.

Among the twenty "Hollerith" accounting machines to be seen on the British Tabulating Company's stand is a machine which operates from graphite pencil marks: a low voltage electricity supply passes through them and after being amplified electronically operates the punch magnets. An automatic check verifies that no marked

positions have been omitted and errors are indicated by the stoppage of the machine or by off-setting the cards in the stacker. The machine can deal with 6,000 cards an hour.

A streamlined automatic key-punch, a universal key punch fitted with reproducing feature, a tabulator, a posting interpreter, an improved automatic verifier with merging control, a high-speed sorter, a reproducing punch with card-controlled punching feature, an interpolator with selected sorting attachment, a cross-adding punch with card-controlled totals, and a universal printing counting sorter are some of the new machines shown by Powers-Samas Accounting Machines (Sales), Ltd.

Both the International Time Recording Co., Ltd., and the Magneta Time Co., Ltd., show new time-card machines of exceptional accuracy, with lost time and overtime indicated in red.

Other exhibitors of time recorders included Block & Anderson, Ltd., Telephone Rentals, Ltd., and Gledhill-Brook Time Recorders, Ltd.

Productivity Study

STARTING AND CONTROL GEAR

REPRESENTATIVES of the starting and control gear section of the electrical manufacturing industry are to leave for the United States on 23rd November under arrangements made by the Anglo-American Council on Productivity.

The team will be led by Mr. J. R. Walton, managing director of the Electrical Apparatus Co., Ltd. The following is a full list of the delegates:—

Supervisory Group.—Messrs. J. R. Walton (leader), C. W. Cooper (acting assistant works manager, Igranic Electric Co., Ltd.), A. T. H. Davey (general manager, switchgear division, Newman Industries, Ltd.), P. J. Dawton (assistant superintendent, control gear factory, British Thomson-Houston Co., Ltd.).

Technical Group.—Messrs. E. R. Dunning (regional works manager, Midland Electric Manufacturing Co., Ltd.), N. L. Hollins, (assistant works manager, George Ellison, Ltd.), A. W. E. Thompson (production engineer, Midland Electric Manufacturing Co., Ltd.), J. H. Weaver (production engineer, George Ellison, Ltd.), J. S. Wright (assistant superintendent, switchgear department, Metropolitan-Vickers Electrical Co., Ltd.).

Workshop Group.—Messrs. W. J. Bough (chargehand, George Ellison, Ltd.), F. Hyde (toolsetter, Midland Electric Manufacturing Co., Ltd.), A. C. Jones (floor-chaser, Igranic Electric Co., Ltd.), P. O'Grady (electrical fitter, Electrical Apparatus Co.).

The secretary is Mr. L. J. Attewill (organizer of technical work, Electrical Apparatus Co.).

On 9th November the team paid a visit to the Rugby works of the British Thomson-Houston Co., Ltd., and the accompanying picture shows them with Messrs. W. W. Vinsen, director of manufacture; H. L. Satchell, director, and manager Rugby works; H. F. Farmer, superintendent, control gear factory; C. J. Sarjeant, consultant control gear engineer; C. F. Gimson, head of control gear engineering division; and G. H. Clipstone, manager, control gear sales division.

Members of the starting and control gear team, which is to visit America, at the B.T.H. works

Seated (left to right): Messrs. P. J. Dawton, C. J. Sarjeant, L. J. Attewill, W. W. Vinsen, J. R. Walton, H. L. Satchell, C. W. Cooper, H. F. Farmer and E. R. Dunning. Standing: Messrs. P. O Grady, F. Hyde, J. S. Wright, C. F. Gimson, G. H. Clipstone, A. T. H. Davey, W. J. Bough, A. W. E. Thompson, A. C. Jones, N. L. Hollins and J. H. Weaver.

Electricity in Cotton Mills

Securing Increased Production

AN outline of the scope for increasing use of electricity in the manufacture of cotton yarns and piece goods was contained in the paper presented to the Utilization Section of the Institute of Electrical Engineers last week by Messrs. F. W. Cox (Metropolitan-Vickers Electrical Co., Ltd.) and W. E. Swale (No. 1 Sub-Area (Manchester) North Western Electricity Board).

The paper commenced by indicating the dramatic decline of output from this once basic industry, which before the war accounted for nearly 30 per cent in value of Britain's total manufactured exports. Different aspects of the subject were then examined to show how during the last fifteen years conceptions of the functions of electricity in a mill had broadened very perceptibly. It was no longer a question of the cheapest form of drive, but which form yielded the greatest output per operative.

Three Methods

Production could be increased in three ways: (i) by the recruitment of more operatives (which raised problems outside the scope of this paper), but it was significant that workers were undoubtedly attracted to modern mills operated electrically; (ii) by the installation of new and more efficient machinery, the cost of which was high and could often be justified only on the basis of two-shift working; (iii) the utilization of existing plant to better advantage by re-spacing machines, re-deploying labour and making fuller use of mechanical and electrical aids.

Many textile establishments were at present following a combination of all three ways; in all cases the electrical engineer had a valuable contribution to offer. The authors claimed their paper to be an epitome of electrical practice. They pleaded for the publication of further studies by specialists so that all aspects might be adequately covered.

They confidently asserted that the correct and full use of electrical energy would do much to revive and quicken an industry which had a glorious past, but faced an incomparably more difficult future.

DISCUSSION

Mr. C. F. Freeman (Courtaulds, Ltd.) opened the discussion by saying that in the paper one heard the authors tolling the knell of the steam engine, but not the wedding bells heralding the happy union between electricity and the textile industry. The steam engine had caused a good deal of stagnation in the industry, because the arrangement of the mill had to suit line shafting layouts and could not readily be altered. The use of electricity made it possible to lay out the mill to the best advantage and to change the arrangements when desired. Full advantage, however, had not been taken of this facility and often all that had been done was to put an electric motor on to an existing machine in place of the original belt drive.

He welcomed the reference in the paper to the advantages of standardizing the dimensions of motors for driving looms. Most users felt strongly on this subject, but manufacturers seemed to frown on it. Apart from the coal-mining industry, there was hardly one which could be compared with the textile industry in its possibilities for the application of electricity. With vision and courage it might be possible to say that "Lancashire will do today what the rest of the world will not do until to-morrow."

Mr. S. Birchall (B.T.H. Co.) said that owing to the export drive new textile machinery for the home market was hard to obtain. The short-term policy of modernizing existing plant was of paramount importance. Under a recent Act of Parliament a grant of 25 per cent for re-equipment schemes was available to groups of concerns having a minimum of 400,000 spindles. A number of such groups had been formed. Application for the grant had to be made before April, 1950, so that it was up to everyone in the

electrical industry to go after this business. In the past, the unattractive tariffs offered in some areas had held up electrification schemes, while in areas where the tariff offered had been attractive greater progress had been made. It would be interesting to know whether in future any special incentive would be given to the textile consumer.

Unlike the authors, he regarded the mineral-insulated copper-covered conductor as very flexible and most adaptable for fitting to machinery and negotiating awkward corners. An important consideration was that it was impervious to moisture and oil, whereas he knew one weaving shed where v.i.r. cables in conduits under the floor had to be ripped out and replaced at least once in three years, due to condensation. For cabling systems overhead busbar trunking was becoming very popular, especially for individual drives, and could be installed without interruption to production, which was an essential condition in conversion schemes.

Referring to the cost of conversion schemes, he said that in a 33,000-spindle mill, ring spinning, with 450 spindles per frame, the cost for semi-group driving came to £70 per frame and for individual driving to £80-£100 per frame with a constant-speed motor, or £400 per frame with a variable-speed motor. For semi-group driving applied to mule spinning the cost per spindle was about the same.

Mr. D. C. Robinson (British Nylon Spinners, Ltd.) emphasized the need in cotton mills for avoiding the use of complicated motors if at all possible. The outstanding feature of the squirrel-cage induction motor was its robustness and in the nylon industry it was standard for 99 per cent of applications, because it was essential that production should not stop. Their electricity supply had to be available for every moment of the day and night; what their Electricity Board called a "dip in pressure," lasting only a few seconds, could lose them many hours of production.

Mr. C. V. Hill (B.T.H. Co.) said that the whole point of individual loom motor drive was to minimize the amount of speed variation as compared with that normally obtained on line shafting drive. The authors appeared to suggest that there might be a total variation of 26 per cent; he thought that there must be something wrong there, for with such a variation a flywheel would be necessary. He also thought that the authors' starting torque of 3-4 times the full-load torque was too high, except for certain automatic looms. The use of the variable speed motor instead of a constant speed motor involved considerable extra cost for every problematical improvement in performance, and would often be uneconomic.

The authors briefly replied.

Hospital Lighting

SOME of the more specialized lighting requirements in hospitals were commented upon by Messrs. M. W. Peirce and D. J. Reed in the paper which they presented at a meeting of the Illuminating Engineering Society held last week at the Lighting Service Bureau, London.

An attempt was made to classify theatre systems according to surgical needs for operations (1) at the surface, (2) on deep seated organs which could be brought to the surface for examination, (3) in a deep cavity through a large incision, and (4) in a deep cavity through a small incision. It did not seem possible to provide correct illumination from a single fitting for all those purposes.

Besides optical suitability, colour rendering must be such as to avoid hesitation in judging the condition of the patient. Fluorescent lamps of various colours were thought to be more accurate in this respect than the incandescent lamp. To meet changing conditions during the course of an operation, it was necessary to provide some degree of adaptability in the lighting arrangement. Various ways in which this could be done, both mechanically and optically, were explained.

The exact meaning of "shadowless lighting," as understood by the illuminating engineer, was explained and it was shown that the amount of shadow produced by a fitting tended to increase as the penetrating power of the system increased.

For pathological work a fairly high intensity of good colour was necessary; the fluorescent lamp would seem to be satisfactory for this purpose, although directional lighting might be necessary when slight surface irregularities of tissues were being studied. For dental work lighting similar to that derived from large windows in daytime must be considered.

Electricity Supply

Brimsdown "B" Extensions : Increased Output in October

ON 22nd November, Mr. A. N. East, Chief Engineering Inspector, Ministry of Fuel and Power, is to conduct an inquiry at the Public Offices, Enfield, Middlesex, into the application by the British Electricity Authority for consent to the extension of the Brimsdown "B" generating station. The proposal is for the installation of a 60 MW turbo-alternator and two 360,000 lb/hr boilers, and the construction of two 160ft high reinforced concrete cooling towers

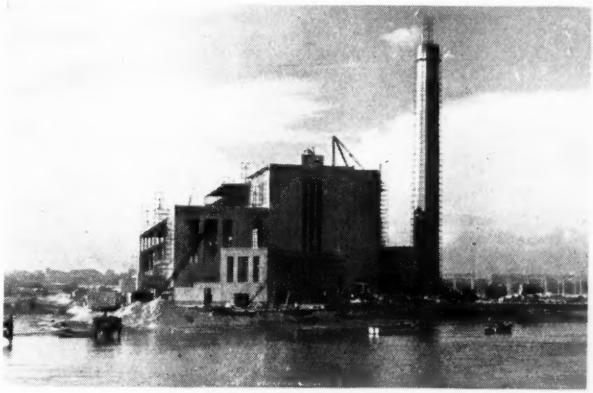
Fleetwood Project

The B.E.A. has applied to the Minister of Fuel and Power for consent to the construction of a 180 MW generating station on a site of about 115 acres at Fleetwood. The initial installation will comprise a 30 MW turbo-alternator and 300,000 lb/hr boiler unit, together with one reinforced concrete cooling tower.

Electricity in Council Houses

At a Silsden Council meeting last week the chairman, Mr Horace Fortune, read a petition from fifty-one of the Council's tenants requesting the installation of electricity in houses on one of the Council's estates. The tenants offered to pay an increased rent to cover the cost of installation. The matter was referred to the Housing Committee.

Smethwick Corporation is applying to the Ministry of Health for consent to borrow £35,500 for the installation of electricity in pre-war Corporation houses. There are 1,541 such houses without electricity in the borough.



After two years' work the new power station at Poole, Dorset, which is being built on land recaimed from the harbour, is beginning to take shape. When completed, it will have a capacity of 200 MW. The initial installation is expected to be in operation by the end of next year

Generation in October

During October 4,204 million kWh was generated by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co., an in-

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	2,475	4.3	4,079	23	4,116	3,878	13,284
North of Scotland	21	0.9	32	53	88	86	325
Total for October, 1949	2,496	5.2	4,111	76	4,204	3,964	13,609
Total for October, 1948	2,386	4.3	3,873	128	4,019	3,793	13,150
Increase or decrease per cent ...	+4.6	+20.9	+6.1	−40.6	+4.6	+4.5	+3.5
Total for January–October, 1949	23,203	40.8	38,202	903	39,264	37,011	
Total for January–October, 1948	22,521	32.0	36,247	1,081	37,461	35,330	
Increase or decrease, per cent ...	+3.0	+27.5	+5.4	−16.5	+4.8	+4.8	

* The total figure includes generation by oil engines, refuse destructors and waste heat plants amounting to 8.0 million kWh, 0.2 million kWh and 9.2 million kWh respectively in October, 1949.

crease of 4.6 per cent compared with October, 1948. Installed capacity (13,609 MW) shows a net gain of 459 MW. Water power production continued at a much reduced level, as will be seen from the accompanying analysis.

Boiler Corrosion

Electro-chemical Action Explained

PRINCIPAL forms of corrosion inside steam boiler equipment, together with the several ways in which feed water may be treated, are described in some detail in a paper prepared by Mr. H. Hillier (G. & J. Weir, Ltd., Glasgow) for the Institute of Marine Engineers in London.

The author's endeavour has been to show that the main causes are the hydrogen-ion concentration of, and presence of dissolved oxygen in, the boiler water. The physical facts about the former and methods of removing the latter are discussed while equipment designed to provide feed water that is free from oxygen is described.

The paper illustrates the fundamental factors with the aid of instructive diagrammatic representations of the electro-chemical actions concerned, in order to explain the physical phenomena involved in the conditioning of water for checking the formation of scale and arresting corrosion before it becomes destructive.

Facts about various water-processing systems and other basic data are included in the paper, which is not intended to be a guide to the actual treatment of water to be used for steam raising. In fact the author concludes by strongly recommending consultation with specialists for advice on this matter. The paper ends with a bibliography of twenty-one references to the subject.

Philco Fire Appeal

ON 8th November, the Court of Appeal heard an appeal from the decision of Mr. Justice Jones, in the King's Bench Division, in an action brought by the Philco Radio and Television Corporation of Great Britain, Ltd., against J. Spurling, Ltd., Bethnal Green.

The Philco Corporation's case was that on 16th November, 1944, the defendants erroneously delivered to their Perivale factory some cases of film scrap, and that a fire was caused thereby. The defendants said that the fire was due to the negligence of a female typist at the factory who ignited some of the scrap with a lighted cigarette.

Mr. Justice Jones said that the typist's action was not such as to relieve the defendants from their liabilities, and directed that damages should be assessed by an Official Referee.

On behalf of appellants, counsel contended that the erroneous delivery of the film scrap at the factory could not make them liable for the deliberate act of the typist.

Dismissing the appeal, Lord Justice Tucker said it was clear that the appellants had been negligent in delivering this highly inflammable material without warning. It was not established that the typist appreciated the nature of the scrap and the almost inevitable result of setting it alight. He agreed with Mr. Justice Jones that the typist's behaviour was not such a conscious act of volition as to relieve the appellants of liability for their admitted negligence.

Leave to appeal to the House of Lords was refused.

Rolling-Stock Maintenance

ON Monday last we inspected an instruction train which is being put into service by London Transport for the staff in the Rolling Stock Division of the Chief Mechanical Engineer (Railways).

Courses will be arranged for all grades of the rolling-stock maintenance staff, and will take place during working hours.

The train comprises five cars converted from tube-type trailers dating from 1919, which had been withdrawn from service for scrapping. The interiors have been entirely reconstructed. One car is fitted out as a lecture room with blackboard, tiered seating for twelve students, and an epidiascope. The instructor's office is also in this car. The other four cars contain the various items of equipment.

There are three complete sets of traction control gear, each of a different type in common use, various models of Westinghouse and electro-pneumatic brake apparatus, the latest automatic coupler and a pair of pneumatically operated doors. Additional teaching aids are provided by cutaway items of equipment placed on benches, together with wiring and other diagrams. Perspex has been used to a considerable extent for the covers of equipment, so that its actual working can be examined in detail. There is also a compressor of standard type, to provide air for the pneumatically operated equipments, and a motor generator, which serves the dual purpose of supplying 50 V d.c. for operating some of the demonstration equipments, and 110 V at 850 c/s for the fluorescent lighting installed in three of the cars.

The train was designed and the work of conversion carried out by the staff under the direction of the chief mechanical engineer, Mr. W. S. Graff-Baker.

FINANCIAL SECTION

Company News — Stock Exchange Activities

Reports and Dividends

The Calcutta Tramways Co., Ltd., held its annual meeting on 9th November, when Sir Geoffrey Clarke (chairman), who presided, said that the full effect of the awards under wage tribunals was not felt in the year to 31st December last. From the returns to date it was evident that the total cost of running and maintaining the undertaking in the current year would show an increase. During the year they had suffered from several short sectional strikes and there had been considerable political unrest resulting sometimes in riots and the burning of tramcars. The figure of £275,000 for outstanding commitments included the cost of new cars and sundry miscellaneous equipment. In addition they estimated that further improvements to be undertaken over the next five years would require £225,000. It was intended to meet this expenditure out of the present resources of the company with the additions of reserves to be set aside out of future earnings as the work progressed. Referring to the future tenure of the company, Sir Geoffrey said that Mr. D. Webb had had interviews with the Premier of West Bengal and the Minister of Finance at which the whole position was discussed, and it was felt as a result of them that an agreement might be reached acceptable to the Government and to the shareholders as to the future tenure of the company, and the terms on which the Government ultimately might acquire the undertaking.

Scophony-Baird, Ltd.—In the course of his speech at the annual meeting held on 9th November, Mr. J. Diamond (chairman) said that the reorganization of the Baird and Bryce undertakings had now been carried out and their production plans fully co-ordinated. They had a full order book, while sales of other products during the six months since the date of the accounts showed a substantial increase on those of the previous year. They had received every possible assistance from their bankers, but the provision of funds on a more permanent basis was desirable. They were therefore considering the best methods of adjusting the capital of the company. It was estimated that by the end of 1954, 80 per cent of the population of the United Kingdom would be covered by a television service. It was clear, therefore, that they were at the very start of major developments in the television industry and they must equip themselves in all respects to reap the fullest possible benefit during the next five years.

Morphy-Richards, Ltd.—In the course of his speech at the annual meeting held on 17th November, Mr. G. Wansbrough (chairman) said that their automatic electric iron continued to be the backbone of their business, and sales of irons showed an increase for the year of over 20 per cent. Since the end of the financial year further increase had been achieved in the rate of weekly production, which was now coming up to a rate of 15,000 a week, but after meeting their export sales this still did not satisfy the demand at home. The automatic toaster had been well received and the output was steadily increasing, the demand from Canada alone was in excess of their present output. With the new sterling/dollar rate they could market on reasonable terms not only the toaster but also their iron, and if they could increase their production as they would wish they were satisfied they could do a really substantial business there. This could not be done without a substantial addition to their manufacturing space. They had sought unsuccessfully to requisition a factory in the district used by a Government Department and to establish a factory in a development area.

The Electrolytic Zinc Co. of Australasia reports a net profit for the year ended 30th June last of £1,068,600, as compared with £516,842 for the previous year. Dividends on preference and ordinary totalled 15 per cent (same), and in addition a bonus of 10 per cent is paid (against nil). The balance carried forward is £220,645 (against £219,364 brought in).

Marco Refrigerators, Ltd., reports a net profit, before taxation, for the year ended 30th September last of £66,711, as compared with £80,573 for the preceding year. Taxation requires £36,401, and the final dividend is 17½ per cent, maintaining the distribution for the year at 30 per cent.

Tube Investments, Ltd., reports aggregate trading profits of the group for the year ended 30th July last amounting to £4,840,467, after provision of £1,078,782 for depreciation on fixed assets as revalued in 1948 but before profits tax and income tax. This compares with £5,042,521 for

the previous year, after provision of £1,126,513 for depreciation on the same lines. After providing for taxation the net profit of the group is £2,064,075 (against £2,071,200). It is proposed to pay a final dividend on the ordinary stock of 12½ per cent actual, less tax, making 25 per cent, less tax, for the year, and at the same rate relatively on the liaison ordinary shares. These rates are the same as for the preceding year.

Broadcast Relay Service, Ltd., has declared an interim dividend of 8 per cent, tax free (unchanged).

New Companies

Brocks Refrigeration, Ltd. — Registered 3rd November. Capital £10,000. To acquire the business of a refrigeration and electrical engineer carried on by S. Brock as Brocks Refrigeration and Electrical Services at Newcastle-on-Tyne. Directors: S. Brock, Mrs. Elizabeth S. Brock and H. McNaughton. Reg. office: 9, Marlborough Crescent, Newcastle-on-Tyne.

R. Maughan & Son, Ltd.—Registered 3rd November. Capital £500. Manufacturers and repairers of and dealers in electrical appliances and apparatus, wireless and television sets and parts thereof, etc. Directors: R. Maughan and Mary M. Maughan. Reg. office: 19, Victoria Road, Ruislip Manor, Middlesex.

C. B. Waterhouse (Barrow), Ltd.—Registered 5th November. Capital £1,000. To acquire the business of a wireless and electrical distributor, dealer and manufacturer carried on by N. Lowe-Williams at Barrow-in-Furness, as C. B. Waterhouse. Directors: N. Lowe-Williams and Mrs. Annie Lowe-Williams and H. K. Johnson. Regd. office: 1, William Street, Barrow-in-Furness.

Wolsey Television (Scotland), Ltd.—Registered 4th November. Capital £100. Directors: W. Wolsey, H. S. Melly, E. J. Harbour and L. Conway. Regd. office: Fenwick House, 289/293, High Holborn, W.C.1.

T. T. Reedy, Ltd. — Registered 4th November. Capital £1,000. To acquire the business of an electrical contractor carried on by T. T. Reedy at 173, St. Albans Road, Watford. Directors: T. T. Reedy and Ethel Reedy. Regd. office: 173, St. Albans Road, Watford.

Nichrotherm Electrical Co., Ltd.—Registered 26th October. Capital £500. To acquire the business of electrical contractors carried on by A. G. Cox and A. E. Drew at 19, Spring Bridge Road, Ealing, W.5. Directors: A. G. Cox and A. E. Drew. Regd. office: 19, Spring Bridge Road, Ealing, W.5.

Denmor Aerial Installations (Hatfield), Ltd.—Registered 17th October. Capital £1,000. Manufacturers of and dealers in electrical and mechanical apparatus and accessories, television sets and installations, etc. Directors: J. Dent and E. W. Morgan. Regd. office: 89, St. Albans Road, Hatfield, Herts.

Liquidations

Salisbury Transformer & Electrical Co., Ltd. — Members' voluntary winding-up. Particulars of claims by 5th December to the liquidator, Mr. A. T. Burden, 70a, Hamilton Road, Salisbury.

Durrington Electric Light Co., Ltd.— Members' voluntary winding-up. Meeting of members on 20th December at Avon Chambers, 31, Castle Street, Salisbury, to receive an account of the winding-up by the liquidator, Mr. P. Grant.

Chingford Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. G. Weaver, 183, High Road, Loughton, Essex.

Bankruptcies

T. Bickerstaffe, residing and carrying on business at 131, Dibbleton Lane, Preston, Lancs, electrical contractor.—Trustee Mr. F. C. Ormond, 20, Byrom Street, Manchester, Official Receiver, released 3rd November, 1949.

H. Evans, carrying on business at 60, Berners Street, London, W.1, electrical factor.—First and final dividend of 20s in the £ (and 3 11/16 per cent interest on account of 4 per cent statutory interest), payable 23rd November at Bankruptcy Buildings, Carey Street, London, W.C.2.

N. A. Peters, carrying on business at 192, Robin Hood Lane, Hall Green, Birmingham, electrical and wireless engineer.— First and final dividend of 20s in the £, payable 20th November at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

L. Atelson, trading as Leonards, 336, Station Road, Harrow, Middlesex, radio and electrical fittings. — Receiving order made 4th November on a creditor's petition.

R. S. Warrell, trading as R. S. Warrell & Son, electrician, 2, Norfolk Road, Littlehampton.—First dividend of 4s in the £, payable 6th December at 6 & 7, Old Steine, Brighton.

T. Sharpe, 62, Oldham Road, Springhead, Yorks, electrical contractor.—Order of adjudication dated 24th December, 1931, annulled. Receiving order dated 22nd December, 1931, rescinded, and petition dated 5th December, 1931, dismissed, as debts have been paid in full. Date of annulment and rescission, 7th November, 1949.

FINANCIAL SECTION
STOCKS and SHARES

THE market for British Government stocks has taken on an appearance more appropriate, and more common, to that shown as a rule by the mining departments. The Government came in with substantial support for the whole of the gilt-edged group. This led to almost spectacular rises, the full extent of which was by no means held. When the excitement subsided, business became more normal. The first effect of the boomlet in Government stocks was to rally the prices of popular industrials which had been moving in correspondence with the heaviness of the Funds.

The two British Electricity 3 per cent stocks jumped about 2 points during the dramatic turn-round in the gilt-edged market. This movement took the senior issue dated 1968/73 — the original "compensation" stock—to 92¼ and the 1974/77 stock to 91¼. Longer-dated and "undated" stocks went further ahead, British Transport 3 per cents gaining 2¾ to 88, and War Loan 3 points to 91. A few days earlier, a fresh slide had dropped prices to their lowest levels since the end of 1939. British Gas 3 per cent 1990/95 recovered 2¼ to 85¼.

Price Changes

Most of the changes on the week are comparatively small. C. A. Parsons at 57s 6d are ½ down. Ericssons at 37s 6d and Reyrolle, 57s 6d, are both a florin easier. Aberdare Cable at 52s 6d show a fall of 2s 6d. British Electric Traction, 1455, is 30 points down; Cable ordinary shed 5½, to 232½. Other declines range from 6d to 1s. Amongst them are General Electric 71s 6d, Henley's 21s 6d, British Insulated Callender's 31s, English Electrics 42s 6d and Crompton Parkinsons 22s. In the few rises, Great Northern Telegraphs at 13½ show a gain of 10s, and a few pence advance has lifted Burco to 20s. Whitehall Electric Investments preference are quoted at a guinea, ex the return of capital.

Cable & Wireless

Opening shots have been exchanged between Cable & Wireless, sponsors of the plan for continuing part of the business as an investment trust, and the stockholders' committee which champions the cause of liquidation. After rising to 236 on the latter's presentation of their case, the price of the ordinary stock relapsed to 232½ since Sir Edward Wilshaw's reply. To succeed, the company's scheme needs approval by holders of 75 per cent of the ordinary stock.

Tube Investments

A drop of 10s to 5½ in the price of Tube Investments £1 ordinary, seemed out of proportion to the extent of the setback reported in the preliminary profits statement for the year ended last July. Group trading profit, before taxation, is £200,000 lower at £4.8 million, but, with smaller tax provisions, this time the net figure is very little changed at just over £2 million. The dividend, which is maintained at 25 per cent for the year, takes little more than a quarter of that figure, so that the payment remains highly conservative. Yield on the shares is just over 4½ per cent.

Vactric

Another stage in this year's extraordinary market performance of Vactric 5s shares was reached last week, when the company issued a statement with the annual accounts. These showed a group loss of nearly £60,000, which the board says can be regarded as exceptional, the parent company's position being much better than this figure indicates. Market interest was focused, however, on the statement concerning offers for the shares. Rumours in this connection have been mainly responsible for the violent fluctuations of the shares. The price has been up to 22s this year; it dropped on the latest announcement to 7s 6d. There has been no conclusion to the deal for a sale of the managing director's shares to an outside party, involving the repayment of the Treasury loan, of which Vactric have drawn £340,000. There is a hint, however, that other negotiations are in progress.

Preference Shares

As a measure of this year's fall in preference share prices, the 7 per cent issues of, for instance, Electric Construction, Ericssons and Automatic Telephone have all been over 35s this year and are quoted now at about 28s 9d, yielding £4 17s 6d per cent. G.E.C. 7½ per cents are 30s, having been over 40s earlier this year; Crompton Parkinson "eights" at 33s are also 10s below the best. Among the 6 per cent issues, B.I.C. shares have fallen from a top of 33s to 26s 3d, at which the return is £4 11s 6d per cent. These higher-priced shares have suffered particularly from the vague mistrust engendered by such events as the proposal to repay Cable & Wireless preference at par, although these have no obvious application to the type of shares mentioned above. As noted here before, the 4 per cent issues hold their ground comparatively well.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

3930. Sperry Gyroscope Co., Inc.—Reflex electron-discharge devices. 24th March, 1942. (631164.)

1944

24535. British Thomson-Houston Co., Ltd.—Apparatus for starting electric-discharge devices. 9th December, 1943. (630607.)

26149. Submarine Signal Co.—Electro-acoustic transducer. 3rd May, 1940. (630667.)

1945

27910. British Thomson-Houston Co., Ltd.—Electric circuit-breakers. 2nd November, 1944. (630674.)

29156. Siemens Bros. & Co., Ltd., Bartlett, C. J. C., and Moss, S. H.—Thermionic valve circuits. 2nd November, 1945. (630728.)

1198. Telephone Manufacturing Co., Ltd., and Harrison, K. W.—Electrical control networks. 15th January, 1945. (630954.)

6205. Sperry Gyroscope Co., Inc.—High-frequency apparatus. 24th March, 1942. (Divided out of 631164.) (631166.)

9757. General Electric Co., Ltd., and Jesty, L. C.—Television, photo-copying and like processes. 18th April, 1945. (631095.)

11005. British Thomson-Houston Co., Ltd.—Electromagnetic switches. 2nd May, 1944. (631167.)

26684. British Thomson-Houston Co., Ltd.—Push-button switch assemblies. 20th October, 1944. (631236.)

27798. Standard Electronic Research Corporation.—Concentricity measuring apparatus employing X-rays. 16th October, 1944. (631168.)

1946

7976. General Electric Co., Ltd., and Head, N. E.—Negative feed-back amplifying circuits. 14th March, 1946. (630730.)

16067. Marconi's Wireless Telegraph Co., Ltd.—Television and like systems. 29th May, 1945. (630855.)

18655. Brush Electrical Engineering Co., Ltd., and Harris, J. W.—Blade fixing for turbines and the like. 21st June, 1946. (630732.)

19411. Standard Telephones & Cables, Ltd., Jacobsen, B. B., and Paine, J.—Electric wave analyzers. 28th June, 1946. (630858.)

24982. O'Brien, W. J.—Radio position-indicating systems. 27th August, 1945. (630867.)

24986. O'Brien, W. J.—Radio frequency navigation systems. 27th August, 1945. (630685.)

25063. Dulrae, Ltd., and Steele, W. H.—Electrical heating elements. 22nd August, 1946. (630868.)

25285. Roumefort, F. de S. de.—Device for measuring electrical resistances and its application to the measurement of temperatures. 9th September, 1943. (Cognate application 25286/46.) (630687.)

28063. Bendix Aviation Corporation.—Voltage responsive trip circuit. 4th October, 1945. (630690.)

28248. Philips Lamps, Ltd.—Tuning dial systems for radio apparatus. 2nd December, 1942. (630737.)

28958. Standard Telephones & Cables, Ltd.—Dry rectifier elements. 26th October, 1945. (630785.)

29422. Philips Lamps, Ltd.—Superheterodyne receiver provided with automatic frequency control. 12th April, 1943. (Addition to 616358.) (630792.)

32225. Neel, E., and Pye, R.—Electric fluorescent lighting equipment. 30th October, 1946. (630790.)

32235. Standard Telephones & Cables, Ltd., and Frankton, W. J.—Soldering irons. 30th October, 1946. (630875.)

32819. Scholtes, P., and Scholtes, M.—Electric heating plate and its method of manufacture. 5th November, 1946. (630876.)

33000. Aktiebolaget Svenska Elektronror.—Electric discharge tubes with transverse deflection. 7th July, 1945. (630697.)

33035. Decca Record Co., Ltd.—Means for identifying areas or lanes in a radio navigational system. 3rd June, 1946. (630698/630877.)

35223. British Thomson-Houston Co., Ltd., and Graff-Baker, W. S.—Carrier-wave modulation. 27th November, 1946. (630881.)

35302. Brush Development Co.—Piezo-electric crystals and devices. 29th November, 1945. (630794.)

35357. British Thomson-Houston Co., Ltd., and Graff-Baker, W. S.—Carrier-wave modulation. 28th November, 1946. (630882.)

35492. British Thomson-Houston Co., Ltd.—Silicone compositions. 30th November, 1945. (630883.)

35953. Marconi's Wireless Telegraph Co., Ltd.—Radar systems. 31st July, 1941. (630616.)

35981. Edwards & Co. (London), Ltd., W., and Steckelmacher, W.—Measuring devices dependent upon radiometer action. 5th December, 1946. (630885.)

36440. Jones, S.—Electron multipliers and circuits therefor. 10th December, 1946. (630888.)

14670. Harris, K. E., and Court, G. W. G.—Radio communicat on systems for use as aircraft position and like reporting means. 15th May, 1946. (Cognate application 7461/47.) (630964.)

17293. Philips Lamps, Ltd.—Circuits for converting a periodic voltage into a voltage of stepped wave-form. 1st October, 1945. (631171.)

19078. Philips Lamps, Ltd.—Apparatus for medical examination by means of X-rays. 13th May, 1942. (630966.)

19381. Philips Lamps, Ltd.—Variable condensers, such as trimmers. 13th May, 1942. (631108.)

19785. Radio Corporation of America.—High-voltage apparatus. 14th July, 1945. (630967.)

20249. Standard Telephones & Cables, Ltd.—Radio beacon system. 31st July, 1945. (Cognate application 20250/46.) (631172.)

22320. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Measuring devices provided with graduated adjustable resistors. 29th October, 1942. (631239.)

25725. Hatte, P. L. M.—Amplification devices for amplifying variable width pass bands in radio electrical apparatus. 11th October, 1944. (631177.)

25907. Automatic Telephone & Electric Co., Ltd., and Tierney, A. J.—Electric motors. 29th August, 1946. (631178.)

26157. Philips Lamps, Ltd.—Receivers for pulse-modulation signalling systems. 25th November, 1942. (631179.)

30287. British Thomson-Houston Co., Ltd.—Electric cookers. 11th October, 1945. (631185.)

35775. Bush Radio, Ltd., and Harrison, W. H.—Thermionic valve amplifiers. 3rd December, 1946. (630986.)

37437. Zellweger, Ltd.—Electric clock synchronizing systems. 20th December, 1945. (631192.)

1947

700. Beardmore & Co., Ltd., W., and Lewis, J.—Regulator gear for electric arc furnaces. 8th January, 1947. (630894.)

758. Philips Lamps, Ltd.—Electric-discharge tubes. 26th July, 1943. (630707.)

2156. Philips Lamps, Ltd.—Electric-discharge tube apparatus. 31st December, 1943. (630671.)

2272. General Electric Co., Ltd., and Espley, D. C.—Combined radio transmitting and receiving equipment. 24th January, 1947. (630897.)

5004. Westinghouse Electric International Co.—Magnetrons. 4th November, 1944. (630710.)

5722. Stivin, J.—Device for hardening articles by high-frequency currents. 14th December, 1945. (Cognate application 5723/47.) (630623.)

6170. Compagnie Generale de Télégraphie sans Fil.—Method of making cathodes for thermionic valves. 5th March, 1946. (630624.)

10868. Philips Lamps, Ltd.—Mixing circuits for the production of combination frequencies. 2nd September, 1944. (630802.)

10917. McKay, A. R., and Brooks, A. C.—Control means for electric lights. 23rd April, 1947. (630922.)

11467. British Thomson-Houston Co., Ltd.—Electric blanket control. 30th April, 1946. (630628.)

13781. British Thomson-Houston Co., Ltd.—Resolution of azeotropic mixtures of chloros.lanes. 23rd May, 1946. (630724.)

14002. Whipp & Bourne, Ltd., and Whipp, I. T. L. —Withdrawable electric switchgear. 24th May, 1947. (630725.)

14290. Measurement, Ltd., and Hewlett, S. J.— Revolution counters. 29th May, 1947. (630633.)

14434. British Thomson-Houston Co., Ltd.—High-frequency dielectric heating apparatus. 1st June, 1946. (630738.)

15044. British Thomson-Houston Co., Ltd., and Stretton, A. T.—Cap-like flyers for spinning machines. 6th June, 1947. (630635.)

15263. Foxboro Co.—Electrical measuring apparatus. 12th June, 1946. (630638.)

16793. British Thomson-Houston Co., Ltd.—Preparation of tetramethyl silicate. 26th June, 1946. (630644.)

16794. British Thomson-Houston Co., Ltd.—Directive radio transmission systems. 11th January, 1943. (630645.)

17037. Smith & Sons (England), Ltd., S., Mann, C. E., and Russell, V. J. S.—Electric commutators. 27th June, 1947. (630807.)

17541. Westinghouse Electric International Co.— Direct-current generators. 20th July, 1946. (Addition to 623609.) (630809.)

18114. Measurement, Ltd., Hewlett, S. J., and Richardson, T. A.—Revolution counters. 9th July, 1947. (Addition to 630633.) (630811.)

18481. Western Electric Co., Inc.—Measurement of magnetic field strength. 20th April, 1943. (630750.)

18504. Metropolitan-Vickers Electrical Co., Ltd., and Bailey, R. W.—Combustion-product power plants. 11th July, 1947. (630935.)

18505. Metropolitan-Vickers Electrical Co., Ltd., and Bailey, R. W.—Control apparatus for combustion-product power plant. 11th July, 1947. (630936.)

19776. British Thomson-Houston Co., Ltd., and Oldham, T. J. F.—Accelerometers. 23rd July, 1947. (630650.)

20086. Standard Telephones & Cables, Ltd., Barnard, R. M., and Stray, W. J.—Electrical condensers. 25th July, 1947. (630651.)

20347. Bendix Aviation Corporation.—Dynamo-electric machines. 10th August, 1946. (630652.)

21192. Boucher Inventions, Ltd.—Fluorescent tube lighting systems and transformers therefor. 21st October, 1941. (630760.)

21246. Welch, W. W.—Electric ventilator fan. 5th August, 1947. (630947.)

21552. Singh, W. K.—Production of a substantially two-phase current from a single-phase supply. 7th August, 1947. (630761.)

21657. Hamlyn, P. M.—Manufacture of electric lighting fittings. 7th August, 1947. (630764.)

21927. Standard Telephones & Cables, Ltd.—Signalling system. 18th September, 1946. (630815.)

22788. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. —Three-phase electrode system for electric furnaces. 15th March, 1943. (630767.)

22929. Standard Telephones & Cables, Ltd.—Selective calling system. 7th September, 1946. (630819.)

23983. British Thomson-Houston Co., Ltd.—Refrigerator cabinets. 29th August, 1946. (630820.)

24875. Westinghouse Electric International Co.— Rotary direct-current generators. 12th September, 1946. (Addition to 623209.) (630822.)

26090. Westergaard, O. L. B., and Branczik, K. W. —Cooling towers. 25th September, 1947. (630823.)

29072. Winther, M. P.—Eddy current torque apparatus. 13th January, 1947. (630875.)

30120. Morphy-Richards, Ltd., Prince, N. M., and Anholt, H.—Coffee percolators. 12th November, 1947. (630776.)

30928. Graham & Co., Ltd., A., and Vaughan, C. H. —Electric heating appliances. 21st November, 1947. (630830.)

31530. Westinghouse Electric International Co.— Insulating materials. 7th December, 1946. (630831.)

32832. Valchera, V.—Electromagnetic vibratory interrupters. 12th December, 1947. (630781.)

33769. Rotax, Ltd., and Bourne, W. G.—Protective devices for three-phase electric alternating-current systems. 22nd December, 1947. (630834.)

34127. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Gas turbine installations. 25th April, 1946. (630835.)

34196. Aktieboiaget Metaco.—Method of manufacturing contact supporting springs. 26th June, 1946. (630836.)

34568/9. Westinghouse Electric International Co.— Electric circuit interrupters having arc extinguishing means. 4th January, 1947. (630838/630783.)

35033. English Electric Co., Ltd., and Milligen, R. D. van.—Process plants with compressors driven by waste gas turbines. 31st December, 1947. (630839.)

1786. Standard Telephones & Cables, Ltd., and Mayer, S. E.—Electric cables. 20th January, 1947. (631127.)

2928. British Thomson-Houston Co., Ltd., and Moir, J.—Wired radio signalling systems. 30th January, 1947. (631255.)

4172. Philips Lamps, Ltd.—Radio receivers with band spreading. 16th March, 1944. (630991.)

4507. Bickell, S. F.—Domestic electric cookers. 17th February, 1948. (631197.)

5042. Marconi's Wireless Telegraph Co., Ltd., and Gray, T.—Pulsed echo sounders and like sub-aqueous distance measuring apparatus. 20th February, 1947. (631199.)

5208. Marconi's Wireless Telegraph Co., Ltd., and Price, T. H.—Radio and other modulated carrier transmitters. 21st February, 1947. (630993.)

7799. Communications Patents, Ltd., and Hamburger, G. L.—Cathode-ray oscillograph apparatus. 21st March, 1947. (631203.)

8131. British Thomson-Houston Co., Ltd., and Wilcox, T. W.—Switching and protective devices for electrical power systems. 25th March, 1947. (630999.)

8532. Soc. Alsacienne de Constructions Mécaniques. —Electric oscillation generators, amplifiers and the like. 3rd April, 1946. (631263.)

10402. Standard Telephones & Cables, Ltd., and Kelly, R.—Transformers. 18th April, 1947. (631004.)

12923. British Thomson-Houston Co., Ltd.—Stabilized synthetic polymers. 13th May, 1946. (631006.)

13143. Western Electric Co., Inc.—Cavity resonators. 1st June, 1946. (631208.)

13662. Westinghouse Electric International Co.— Dynamo-electric machines. 8th June, 1946. (631024.)

14006. Oza, H. P., and Marathe, D. H.—Electrically maintained rocking or swinging devices. 4th May, 1949. (631026.)

14186. Sandeman, E. K.—Electrical wave filters. 28th May, 1947. (631210.)

15445. Bendix Aviation Corporation.—Sockets for electron-discharge tubes. 31st July, 1946. (631211.)

16216. Eugene, Ltd., and Forder, L.—Permanent waving of hair by electromagnetic induction. 19th June 1947. (631276.)

16902. Westinghouse Electric International Co.— Polyphase watthour meters. 26th January, 1940. (631033.)

16996. Canning & Co., Ltd., W., and Edgehill, A. B.—Electroplating apparatus. 27th June, 1947. (631015.)

17025. Western Electric Co., Inc.—Dielectric wave guides. 30th March, 1943. (631277.)

17186. Siemens & General Electric Railway Signal Co., Ltd., and Mott, T. E.—Train control systems. 30th June, 1947. (631278.)

17477. British Thomson-Houston Co., Ltd.—Leading-in wire detecting apparatus for use in electric lamp manufacture. 2nd July, 1946. (631017.)

17564. British Thomson-Houston Co., Ltd.—Organodihalogenoloxanes. 29th October, 1942. (631018.)

18987. British Thomson-Houston Co., Ltd.—Radio frequency power measuring apparatus. 1st January, 1943. (631282.)

19036. Watts, R. G., and Davies, H. H.—Control apparatus for fluorescent lighting. 16th July, 1947. (631215.)

19263. Western Electric Co., Inc.—Electrical resistance materials. 27th March, 1942. (631216.)

19265. Western Electric Co., Inc.—Asymmetrical electrical conducting devices. 11th October, 1938. (631041.)

20526. Planer, F. E., Boswell, I. I., and Planer, G. V. — Thermally controlled electric condenser devices. 30th July, 1947. (631044.)

21699. Sylvania Electric Products, Inc.—Holders for electric lamps. 28th February, 1946. (631046.)

21834. Westinghouse Electric International Co.—Electron-discharge apparatus. 1st March, 1939. (631284.)

23266. Brunt, C. H.—Electric test benches. 22nd August, 1947. (631144.)

24113. Poittevin, M.—X-ray or like apparatus. 29th August, 1946. (631289.)

24321. Hoover, Ltd.—Electric hand irons. 7th September, 1946. (631054.)

24503. Standard Telephones & Cables, Ltd.—Rectifiers. 26th October, 1946. (631219.)

24757. South Wales Switchgear, Ltd., and Mather, A. G.—Wash boilers and washing machines. 9th September, 1947. (631145.)

25504. Elcom, Ltd., F. B., and Maxfield, H.—Electric fires. 18th September, 1947. (631220.)

25505. Elcom, Ltd., F. B., and Maxfield, H.—Electric heaters. 18th September, 1947. (631221.)

25654. Pollard & Co., Ltd., E., and Hunter, D. G.—Electric lifts or hoists. 20th September, 1947. (631293.)

26679. General Electric Co., Ltd., and Friedlander, E. S.—Field excitation arrangements for d.c. generators. 3rd October, 1947. (631298.)

27116. English Electric Co., Ltd., and Fenton, L. R.—Maximum demand meters. 9th October, 1947. (631066.)

27153. Akt-Ges. für Technische Studien.—Thermal power plants. 1st November, 1946. (631068.)

27155. Akt.-Ges. für Technische Studien.—Thermal power plants. 2nd November, 1946. (631069.)

27694. Hoover, Ltd.—Insulated core assemblies for dynamo-electric machines. 18th October, 1946. (631072.)

27863. Muirhead & Co., Ltd., and Bell, J.—Electric motors. 17th October, 1947. (631299.)

28817. Automatic Telephone & Electric Co., Ltd., and Terroni, T. B. D.—Electrical signalling systems. 29th October, 1947. (631151.)

29003. Lloyd, J.—Indicator for use on dials of telephone instruments. 30th October, 1947. (631226.)

29132. British Thomson-Houston Co., Ltd.—Automatic mount flashing machines. 2nd November, 1946. (631079.)

31015. Crabtree & Co., Ltd., J. A., and Hill, W. E.—Means for mounting devices such as electrical accessories on the rear of panels or plates. 22nd November, 1947. (631083.)

31076. Westinghouse Electric International Co.—Magnetrons. 28th January, 1943. (631084.)

31372. Jones & Co. (Engineers), Ltd., W., and Jones, H. H. — Methods of winding small electric machines. 26th November, 1947. (631303.)

3197. Robertson, D. R., and Sampietro, A. C.—Electrically operated releasable fastening means. 3rd December, 1947. (Cognate applications 14388/48 and 16936/48.) (631089.)

31987. Walmsley, S. — Thermo-electric convertor. 3rd December, 1947. (631229.)

32594. British Thomson-Houston Co., Ltd., and Petch, Jun., T. H.—Control gear for induction motors. 10th December, 1947. (631091.)

33967. Standard Telephones & Cables, Ltd.—Signal receiver for discriminating signals. 7th May, 1943. (631156.)

1948

10261. Standard Electronic Research Corporation.—X-ray apparatus for testing the physical characteristics of material. 16th October, 1944. (Divided out of 631168.) (631233.)

16087. Westinghouse Electric International Co.—Direct-current generators. 17th July, 1947. (Addition to 623209.) (630841.)

32688. English Electric Co., Ltd., and Milligen, R. D. van.—Compressor-turbine assembly driven by the waste gases of a process plant. 31st December, 1947. (Divided out of 630839.) (630842.)

1949

13585. O'Brien, W. J.—Radio navigational systems. 26th August, 1946. (Divided out of 630435.) (630848.)

Amended Specifications

544433. English Electric Co., Ltd., and another.—Driving means for electrically propelled vehicles.

600344. Brookhirst Switchgear, Ltd., and another.—Electric switches, switchgear and the like, adapted for sparking-prevention.

596698. Sulzer Freres Soc. Anon. — Gas turbine plants.

617248. Marconi's Wireless Telegraph Co., Ltd.—Electron discharge devices of the magnetron type.

Radio and the Engineer

IN London this week, at a joint meeting of the Association of Supervising Electrical Engineers and the Institution of Engineers in Charge, Mr. M. Evans (G.E.C.) presented a paper entitled "Radio and the Engineer." His theme was that whereas in the past the principal interest in radio, other than for entertainment purposes, had been confined to those connected with national and international communication services, recent developments had made it possible for radio to play an important part in much broader spheres of activity. Certain forms of radio equipment were valuable aids to the engineer in many branches of the profession and it was on this aspect that he dwelt. The use of radio for industrial and commercial purposes was still in its infancy, and by describing some of the equipments and facilities which were available or in course of development, Mr. Evans showed just how useful a tool radio could be to the engineer.

Ship Propulsion

POSSIBILITIES of steam-gas combination plant for propelling ships were reviewed in the eighteenth Andrew Laing Memorial lecture before the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-upon-Tyne.

The lecturer this year was Dr. R. W. Bailey (Metropolitan-Vickers Electrical Co., Ltd.) whose study of the subject grew out of a desire some years ago to see the steam turbine recover the ground it was then losing to direct-drive diesel engines in marine propulsion. He gave attention first to combination of the diesel-type gas generator and the gas turbine as the power unit; then later, because of the limitations of this arrangement, to the addition of steam power as the principal member of the partnership.

The lecturer believes this combination to possess advantages for powers of 10,000 h.p. and upward.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—MELBOURNE. — State Electricity Commission. The closing date for the receipt of tenders for one 30 ton electrically operated travelling crane has been extended to 16th November. (11th November.)

Bletchley.—24th November. U.D.C. Electrical installations in 110 houses and eight shops and flats. (See this issue.)

Consett.—3rd December. U.D.C. Supply of thirty hot plates with two boiling plates and griller. (11th November.)

Cumberland.—County Council. Installation of electric wiring and fittings at Whitehaven Grammar School. (See this issue.)

India.—MADRAS.—30th November. Government of Mysore. 1,500 kVA power outdoor unit sub-station with accessories. (C.R.E. (I.B.) 32341/49. Ten/777.)*

NEW DELHI.—17th January. Public Works Department, United Provinces. Turbines, governors, generators and other accessories for Betiva River project. (C.R.E. (I.B.) 32343/49. Ten/778.)*

Lancashire.—County Council. Electrical installation at Morecambe and Heysham, Trumacar Lane, junior and infants' school. (See this issue.)

Luton.—7th December. Corporation. Electrical installations in Council houses. (See this issue.)

Newcastle-under-Lyme.—Corporation. Recommended. Electrical installations at county primary junior and infants' school, Bradwell (£1,180).—Speedy & Eynon, Hanley.

New Zealand.—WELLINGTON.—28th March. State Hydro-Electric Department. Four 44,444 kVA generators. (C.R.E. (I.B.) 51056/49. Ten/762.)*

4th April. State Hydro-Electric Department. Four 56,000 b.h.p. water turbines for Roxburgh power station. (C.R.E. (I.B.) 31055/49. Ten/761.)*

South Africa.—JOHANNESBURG.—13th January. City Council. Ninety-six distribution transformers. (C.R.E. (I.B.) 31264/49. Ten/767.)*

DURBAN.—20th January. Electricity Department. Transformers, ranging from 50 kVA to 1,500 kVA. (C.R.E. (I.B.) 32075/49. Ten/776.)*

Stafford.—Corporation. Street lighting, trunk road A.34. (See this issue.)

Sunderland.—26th November. Borough Council. Electrical installation in 490 houses on the Pennywell estate. Borough engineer, Athenæum Buildings, Fawcett Street.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Wakefield.—26th November. R.D.C. Electrical installations in 66 traditional houses, Shay Lane, Crofton and Stoney Lane, Crigglestone. W. E. Massie, surveyor, Council Offices, 18, St. John's North.

Orders Placed

Durham.—County Council. Fluorescent lighting at Education Department, Shire Hall, Durham, (£346).—Gray Brothers (Newcastle), Ltd. Electrical fittings for the Education Department, (£280).—A. S. McHugh and Co.

Hornsey.—Corporation. Provision of improved street lighting at Archway and Aylmer Roads (£4,272).—British Thomson-Houston Co.

Hull.—Corporation Telephones Committee. Supply of underground cable, (£1,340).—Hackbridge Cable Co.

Manchester.—Corporation. Electrical installations in 220 houses at Woodhouse Park and Moss Nook.—S. B. Wainwright & Co.

Poplar.—Borough Council. Supply and fixing of electrical installations in eight shops and maisonettes at Aberfeldy Street, (£653).—Iverson Electrical.

Sheffield.—Corporation. Electrical installations in 444 houses on the Manor Park estate, schemes 1 & 2, (£9,162).—Hall & Stinson.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Allscott (Salop).—Major alterations and extensions to sugar beet factory; British Sugar Corporation, Ltd.

Barnard Castle.—Houses (30) Cockfield; R.D.C. surveyor, Galgate.

Barnsley.—Houses (52), Athersley estate; T. H. Watford, 40, Dundhill Road, Wombwell.

Barnstaple.—Extensions to Hawley Hospital; South West Regional Hospital Board, 6, Elton Road, Bristol, 8.

Birkenhead.—Factory, Beaufort Road; L. Harris, Ltd., 90, Goswell Road, E.C.1.

Technical and commercial college; Willink & Dod, architects, Cunard Building, Liverpool.

Birmingham. — County primary schools, Shenley Fields site; E. L. Russell, chief education officer.

Caernarvonshire.—Adaptations at Treborth Hall, Menai (£14,827); H. E. Williams, 42, Glanrafon, Bangor.

Kitchen and dining room at Portmadoc (£10,187); G. & J. P. Gregory, High Street, Caernarvon.

Cambridge.—Grain silos, Fulbourne, for Ministry of Works; R. Price, builder, Kingsbury Road, N.W.9.

Canterbury.—Primary school, Reed Avenue (£59,760); Rice & Son, Ltd., builders, Margate.

Cardiganshire. — Extensions to Aberayron school (£90,000) and Ardwyn secondary school (£26,000); G. R. Bruce, county architect, Aberayron.

Carlisle.—Electrical installations in 76 houses for the City Council; city engineer, 18, Fisher Street, Carlisle.

Chepstow.—Houses (50), Caldicot; R.D.C. surveyor.

Cirencester.—Sewage disposal works, two pumping stations, etc., Lechlade, for R.D.C.; A. H. S. Waters, 25, Temple Street, Birmingham, 2.

Connah's Quay.—Technical college, Kelsterton; W. Griffiths, deputy county architect, Mold.

Cornwall.—Schools at Newquay and Saltash, and workshops and classrooms at Falmouth Technical College; S. Gregson, county architect, County Hall, Truro.

Coventry.—Six-storey shop and office block (£282,500), new city centre, for Redevelopment Committee; Higgs & Hill, Ltd., builders, Coventry.

Croydon.—Dwellings (26), Pawsons Road; borough engineer.

Factory and offices, 17/21, Dingwall Road; F. A. Rowsell, Hollymead Cottage, Hollymead Road, Chipstead.

Cupar.—Infants' school (£35,000); county architect, Cupar, Fife.

Exeter.—Shop and office block, High Street; Pearl Assurance Co., Ltd., High Holborn, W.C.1.

Felling-on-Tyne.—Factory for making precast concrete products for the Stoneygate Flooring Co., Ltd.; W. Norman, builder, West Lane, Chester-le-Street.

Fishguard.—Houses (70) for U.D.C.; T. Alwyn Lloyd, architect, 6, Cathedral Road, Cardiff.

Gillingham (Kent).—Permanent houses (84), Eastcourt Lane-Twydall Lane estate; J. C. Nelson, town clerk, Municipal Buildings.

Hornsey.—Flats (26) and Council stores, Stroud Green; J. H. Melville Richards, borough engineer, Crouch End, Broadway, N.8.

Hull.—Three-storey flats, Bellfield Avenue, Dayton Road, Southcoates Lane and Bricknell Avenue sites; city architect.

Keighley.—School of art, Skipton Road; city architect.

Kidderminster.—Extensions to Castle Mills, New Road; Carpet Trades, Ltd., Mill Street.

Kingston-on-Thames.—Dwellings (320), Kingnympton Hall site, for T.C. and Malden and Coombe T.C.; G. Grey Wornum, architect, 39, Devonshire Street, W.1.

Lichfield.—Houses (84) for R.D.C.; Sabin & Young, Rushall, Walsall.

Liverpool.—Flats (18), Cranmer Street; Peake Construction Co., Ltd., 49, Hamilton Square, Birkenhead.

London.—KENSINGTON. Flats (64), Walmer Road-Clarendon Road scheme; borough engineer.

Loughborough.—Houses (86), Thorpe Avenue; William Davis & Co (Leicester), Ltd.

Bungalows (32), Shelthorpe; Simmons Bros., Rothley, Leics.

Northampton.—Bakery, Gladstone Road; W. Q. & T. R. Adams, Ltd., 212, Kettering Road.

Houses (112), Winchester Road; T. Wilson & Son, Ltd., 67, Sheep Street.

Norwich.—Dwellings (262), Cooper Lane estate; city architect, City Hall.

Pembroke.—Houses (50), Golden Hill Road; W. B. Kavanagh, borough engineer, Municipal Offices, Bush Street, Pembroke Docks.

Pwllheli.—District hospital, for Welsh Board of Health; W. L. Jones, county architect; County Offices, Caernarvon.

Sheffield.—Engineering works, Allen Street; Gilbow Tool Co., Ltd., Bridge Street.

Houses (236), Ballifield estate; M. J. Gleeson, Ltd., builders, 822, Chesterfield Road.

Willenhall.—Houses (50), Beacon Colliery estate; J. R. Riding, clerk, Town Hall, Willenhall, Staffs.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 9th November.

BROOK. No. 677,248. Class 7. Electric motors (not for land vehicles).—Brook Motors, Ltd., Empress Works, St. Thomas' Road, Huddersfield.

HI-CRAFT. No. B669,093. Class 9. Apparatus incorporating electric transformers and choke coils for use in controlling the supply of current to electric discharge lamps; and electric switches, switch boxes, plug and socket connections and choke coils. HI-CRAFT. No. B669,094. Class 11. Ceiling roses.—Hi-Craft Electrical Products, Ltd., 25, Manchester Square, London, W.1.

KAVIATOR. No. 676,081. Class 9. Electrical devices for use in conjunction with electricity meters for balancing the variable phase difference between voltage and current, and electricity meters incorporating such devices.—Measurement, Ltd., Terminal House, Lower Belgrave Street, London, S.W.1.

MAZDA. No. 679,812. Class 9. Electric switches, electric induction apparatus, and electric control apparatus included in Class 9. MAZDA. No. 679,813. Electric lighting fittings and lamp shades.—British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.

HISTOKINE. No. 679,931. Class 9. Electrical apparatus and instruments included in Class 9; scientific, weighing, measuring and teaching apparatus and instruments; and parts included in Class 9.—Hendrey Relays, Ltd., 392, Bath Road, Chippenham, Slough, Bucks.

STONEGATE. No. 680,085. Class 9. Electric accumulators and electric batteries, and parts included in Class 9.—The Lithanode Co., Ltd., 100, Queenstown Road, Battersea, London, S.W.8.

RADAR. No. 664,551. Class 11. Electric hair-driers and parts included in Class 11.—Eugene, Ltd., Brooklyn, City of New York, U.S.A. Address for service, c/o Feeny & Feeny, 2a, Charlwood Place, Westminster, London, S.W.1.

SOLIT. No. 678,061. Fluorescent lamps for lighting purposes.—Tellux, Ltd., 17-19, Edge Street, London, W.8.